The RUBBER AGE

August, 1944

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AUG 28 1944
DETROIT

SHORTER CURES
OF
GR-S Stocks

Mold Turn-over can be greatly INCREASED by the use of the NEW copper accelerators CUMATE and CUPRAX.

These quicker curing GR-S stocks are not scorchy and their aging is good.

CUMATE and CUPRAX are available in quantity.

R. T. VANDERBILT CO., INC.
230 Park Avenue, New York City

Newsletter No. 8
AUGUST, 1944

Published by Rubber Chemicals Division of DU PONT

THIONEX—AN ALL-PURPOSE ACCELERATOR FOR GR-S

THIONEX has proven itself one of the most versatile and economical accelerators for rubber and has attained a position of even greater importance in GR-S. With production of GR-S nearing its peak, there will be an increased demand for an accelerator that will meet the requirements of many different types of compounds.

OUTSTANDING QUALITIES of Thionex acceleration in GR-S are:

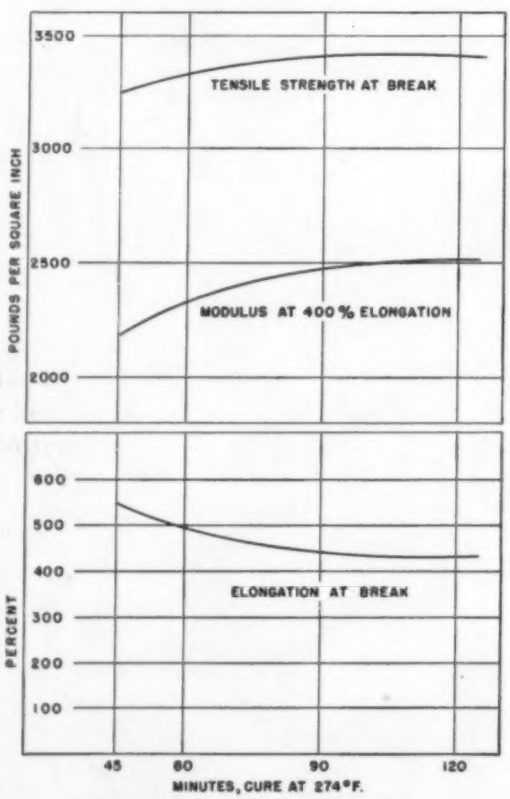
1. Safety in processing.
2. Rapid curing at vulcanizing temperatures.
3. Broad, flat curing range.
4. High tensile strength.
5. Excellent aging and superior heat resistance.
6. Versatility of activation.
7. Acceleration economy.

MOST OUTSTANDING FEATURES of Thionex are its delayed action, or lag, which makes for safety in processing, and its very fast rate of cure at vulcanizing temperatures. GR-S compounds accelerated with Thionex may be exposed to temperatures nearly as high as the curing temperature for a short period of time without setting up, but after this period of lag the cure proceeds rapidly to completion. It is this characteristic of Thionex that is chiefly responsible for its widespread use in a variety of products such as CV wire insulation, drug sundries, mechanical goods, heels and soles, tires, etc.

In addition to curing very rapidly, Thionex accelerated GR-S compounds provide a long curing range with little tendency toward over-cure. This effect is illustrated in the accompanying curves which represent a typical black GR-S compound accelerated with 0.4% Thionex and 2.0% sulfur.

PROPER AMOUNT of Thionex to be used depends on the nature of the compound, type of cure, choice and type of fillers, sulfur content, etc. In some compounds as little as 0.25% Thionex may be used, while in others as much as 4.0% may be used, depending on the characteristics desired in the finished article. Either over or under acceleration will impair the tensile properties of a GR-S compound and for this reason, the proper ratio of Thionex to sulfur should be maintained for best results.

Normally in the neighborhood of 2.0% sulfur is recommended in GR-S compounds accelerated with Thionex, but amounts up to 3.0% or 4.0% may be used to obtain improved dynamic properties. Low sulfur-high Thionex ratios are recommended for applications where a high degree of heat resistance is required. Results of physical tests shown in Table I on a typical black loaded GR-S compound accelerated with 1.5% Thionex and 0.75% sulfur illustrate the excellent heat resistance that is obtainable with this combination.



Typical results obtained on black GR-S compound accelerated with Thionex

TABLE I

	Original	Aged in 100° C. Oven 2 Days	Aged in 100° C. Oven 4 Days
Stress at 200% Elongation—psi	725	775	850
Tensile Strength at Break—psi	2675	2550	2250
Elongation at Break—%	440	410	370
Hardness—Shore Durometer	61	65	67

THE UNIQUE PROPERTIES of Thionex either as a primary or as a secondary accelerator are well known from experience with rubber. This accelerator is considerably more versatile in GR-S, since it can be activated with other accelerators, such as 2-MT, DPG, Accelerator 808, etc., to produce fast curing, economical, high quality stocks, or it may be used as a secondary accelerator to activate Zenite, 2-MT, MBTS, Acrin and others.

SUGGESTIONS

1. When used with Polyac, Thionex is equal in effectiveness to Thiuram M in GR-I compounds.
2. An informal report covering the status of du Pont Rubber Colors has been published.

DU PONT
RUBBER CHEMICALS DIVISION
BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

THE RUBBERB AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. August 1944, Vol. 55, No. 5.

HYCAR PRICES REDUCED *AGAIN*

Fourth Time in Less Than Three Years

TODAY the price of Hycar OR-15 is 50c per pound, thanks to the fourth price reduction in less than three years. Prior to August, 1941 it was 77c per pound. The prices of Hycar OR-25 and Hycar OS-10 have also been reduced again, making the third time since their introduction early in 1943.

These substantial reductions have been made possible through steadily increasing production and more efficient operation. It has always been Hycar's policy to pass along such economies to industry.

Price Schedule
Effective July 1, 1944

	Price per Lb. Standard 100 lb. Containers	Price per Lb. Less than Standard Container	Specific Gravity
Hycar OR-15	$0.50	$0.65	1.00
Hycar OR-25	0.45	0.60	0.98
Hycar OS-10	0.45	0.60	0.98

Prices are net and F. O. B. Akron, Ohio

WPB order R-1 as amended July 1, 1944 has considerably widened permitted uses of Hycar to include curb pump hose, V-belts, and many other items. For any application in which you are interested that is not now permitted, we suggest that you apply to the War Production Board, as a further broadening of allowed uses is anticipated. Shipments up to 200 pounds per month for experimental purposes are permissible without allocation. Our Customer Service Laboratory is always ready to assist you in your experimental work. *Hycar Chemical Company, Akron 8, Ohio.*

Hycar
Reg. U. S. Pat. Off.

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

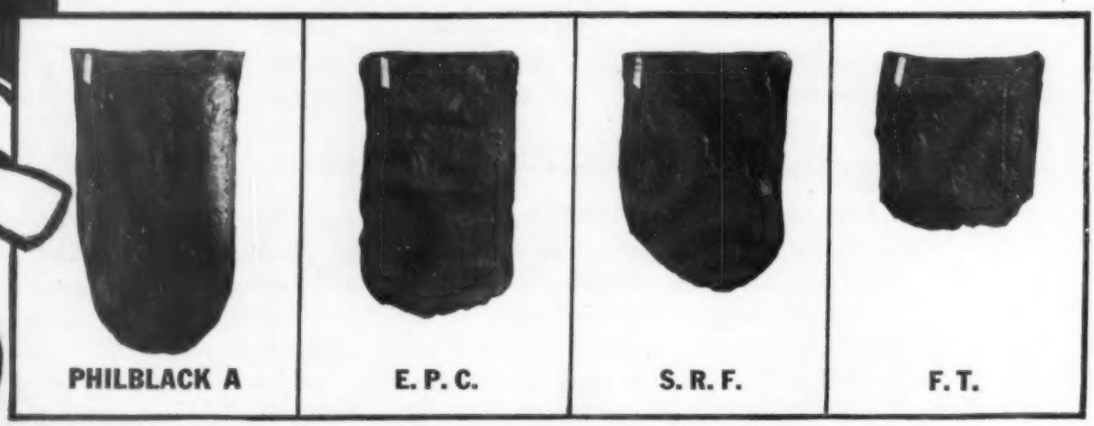
NEW TYPE BLACK

Saves Processing Time . . . Improves Finished Product

PHILBLACK A is the new HMF type black which combines the better properties of channel and furnace blacks, reduces processing time, and produces a high quality product.

Below are unretouched photographs that compare the reduction in nerve obtained by use of PHILBLACK A with that obtained by representative Easy Processing Channel Black, Semi-Reinforcing Furnace Black and Fine Thermal Black.

EQUAL VOLUME MILLED BATCH, 50 PARTS LOADING



These properties for varying amounts of loading are further illustrated in the booklet, "PHILBLACK A". Write for your copy and samples, for your own verification.

PHILLIPS PETROLEUM COMPANY

Philblack Division

FIRST CENTRAL TOWER • AKRON, OHIO

Formula for a postwar seat covering

MATERIALS	WEIGHTS
GEON 101 or 102	100
Dioctyl phthalate	25
Triglycol ester	15
Hycar OR 15	10
Heat and light stabilizer	10
Extender and pigment	40

THAT'S the formula for a heavy-duty calendered sheet of GEON, the new family of vinyl resins and plastics. This leatherlike material will be waterproof and acidproof; in fact, will resist nearly all chemicals including perspiration. It will resist sunlight, aging, heat, cold, wear. It can be easily embossed and brightly colored. It will be an important product in days to come.

From GEON can be made a wide variety of thermoplastic elastomers that can be extruded, pressure or injection molded, calendered, cast into sheet or film, or used as coatings for fabrics and paper.

Properly blended with certain synthetic rubbers, GEON products take on an entirely new set of characteristics. The uses of GEON in all industry seem virtually limitless.

Although GEON is currently limited to industrial users subject to allocation under General Preference Order M-10, limited quantities can be had for experiment. And our research staff and laboratory facilities are available to help you work out any specific problems or applications. Just write, Department K-3, Chemical Division, The B. F. Goodrich Company, E. Ninth and Prospect, Cleveland 15, Ohio.

CHEMICAL DIVISION

THE B. F. GOODRICH COMPANY

ROSE BUILDING E. NINTH & PROSPECT CLEVELAND 15, OHIO

Geon

Vinyl Resins & Plastics

Chemical Uniformity contributes to the wonders of NEOPRENE

It looks like rubber, but it isn't. It has many characteristics of rubber, but effectively resists oil, sunlight, heat and many chemicals. Commercially it's called neoprene.

Neoprene's pre-war uses were numerous in manufacturing parts for the industrial field. Since Pearl Harbor, neoprene uses in fabrication have been widely increased. Because of the unique properties of neoprene it has been given many war jobs, and is doing them well.

Neoprene is mixed with compounding ingredients and vulcanized to form the final product. The successful use of neoprene for peace and war-time projects depends to a great extent upon the uniformity of the chemicals used in compounding and processing it.

One of these is Baker's Magnesium Oxide, Neoprene Grade, made and packaged especially for users of this material. Here, as in many other industries where chemical exactness is paramount, Baker is an important supplier of chemicals to exacting specifications. Baker's chemicals—purity by the ton—have been made for a large number of the nation's leading concerns for the manufacture or processing of numerous products. The roll call of Baker's customers reads like Who's Who in America.

If you have special chemical requirements involving purity to the decimal for war production products or for the anticipated post-war reconversion program, we invite you to discuss your needs in confidence with Baker.

J. T. BAKER CHEMICAL CO.

PHILLIPSBURG, NEW JERSEY

NEW YORK PHILADELPHIA CHICAGO

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

Baker's

For Latex, Dispersions, Adhesives, Etc . . .

NAFTOLEN *Emulsion*

• NAFTOLEN, a product of proven merit for rubber and synthetic rubber compounding, is now available in emulsion form for users of latex and dispersions. This new WILMINGTON CHEMICAL development opens to the latex field the unique possibilities of this unsaturated and sulfur-reactive hydrocarbon. Your sample is now ready for shipment.

Have you tried other WILMINGTON CHEMICAL products?

PLASTICIZER-EXTENDERS
NAFTOLEN R-100
MULTI-PLAST MV
MULTI-PLAST HV
ECONO-PLAST

FILLER-PLASTICIZER
NAFTEX

REINFORCING PLASTICIZER
WILMEX M

W
C=C

REG. U. S. PAT. OFFICE

WILMINGTON
CHEMICAL CORPORATION

10 EAST 40TH STREET • NEW YORK 16, N. Y.

SILICAL

(NEWFOUNDLAND PYROPHYLLITE)

A REINFORCING FILLER FOR USE IN WIRE INSULATION COMPOUNDS

EASY PROCESSING
LOW WATER ABSORPTION
MICA FREE
GOOD ELECTRICAL PROPERTIES
HIGH MODULUS
LOW PERMANENT SET
READILY AVAILABLE

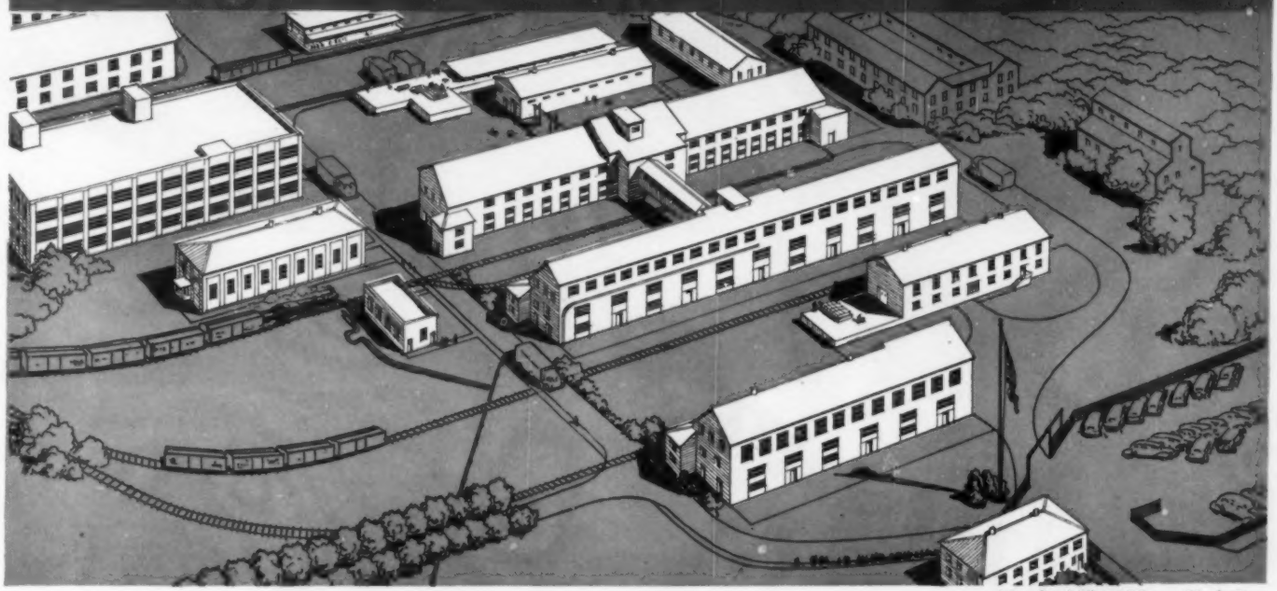
Samples and Technical Data Available

HERRON BROS. & MEYER

82 Beaver Street, NEW YORK 5, N. Y.

516 Ohio Bldg., AKRON, OHIO

AGAIN *GENERAL CHEMICAL* CREATES NEW FACILITIES FOR BAKER & ADAMSON PRODUCTS TO SERVE AMERICAN INDUSTRY!



New B&A Plant, Marcus Hook, Pa.

THESE NEW FACILITIES for production of Baker & Adamson reagent and fine chemicals provide ideal manufacturing areas, additional research and development laboratories, and special storage and shipping accommodations. This plant's output, coupled with that of other Baker & Adamson producing units and distributing stations throughout the United States, marks another forward step in Baker & Adamson leadership.

Basic materials for many Baker & Adamson quality products made here come directly from sixteen of General Chemical Company's producing locations. With such fundamental sources of supply, including many Company-owned mines for raw materials, Baker & Adamson is in a pre-eminent and unique position for meeting the expanding uses of high-purity chemicals in industry.

Whether you require laboratory reagents, fine chemicals, or other products prepared in accordance with your formulae—avail yourself of the Baker & Adamson facilities. Experienced technical service representatives are ready to discuss *your* chemical problems and requirements. Baker & Adamson stocks are carried in many principal cities!

GENERAL CHEMICAL COMPANY

Fine Chemicals for Industrial America

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N.C.) Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Milwaukee • Minneapolis New York • Philadelphia • Pittsburgh • Providence (R. I.) • St. Louis • Utica (N. Y.)

Pacific Coast Technical Service Offices:
Los Angeles • San Francisco • Seattle, Wenatchee and Yakima (Wash.)

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

IN THE EASTERN AREA:
Write, wire or 'phone

WALTER D. TAYLOR
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.
Phone ANSONIA 3600

Joined the Company in 1929. Served five years as machinist apprentice, including one year of drafting, then five years as a journeyman machinist. Worked one year on gear drives. Banbury service man for the last four years. Has studied engineering, machine work and foreman training.

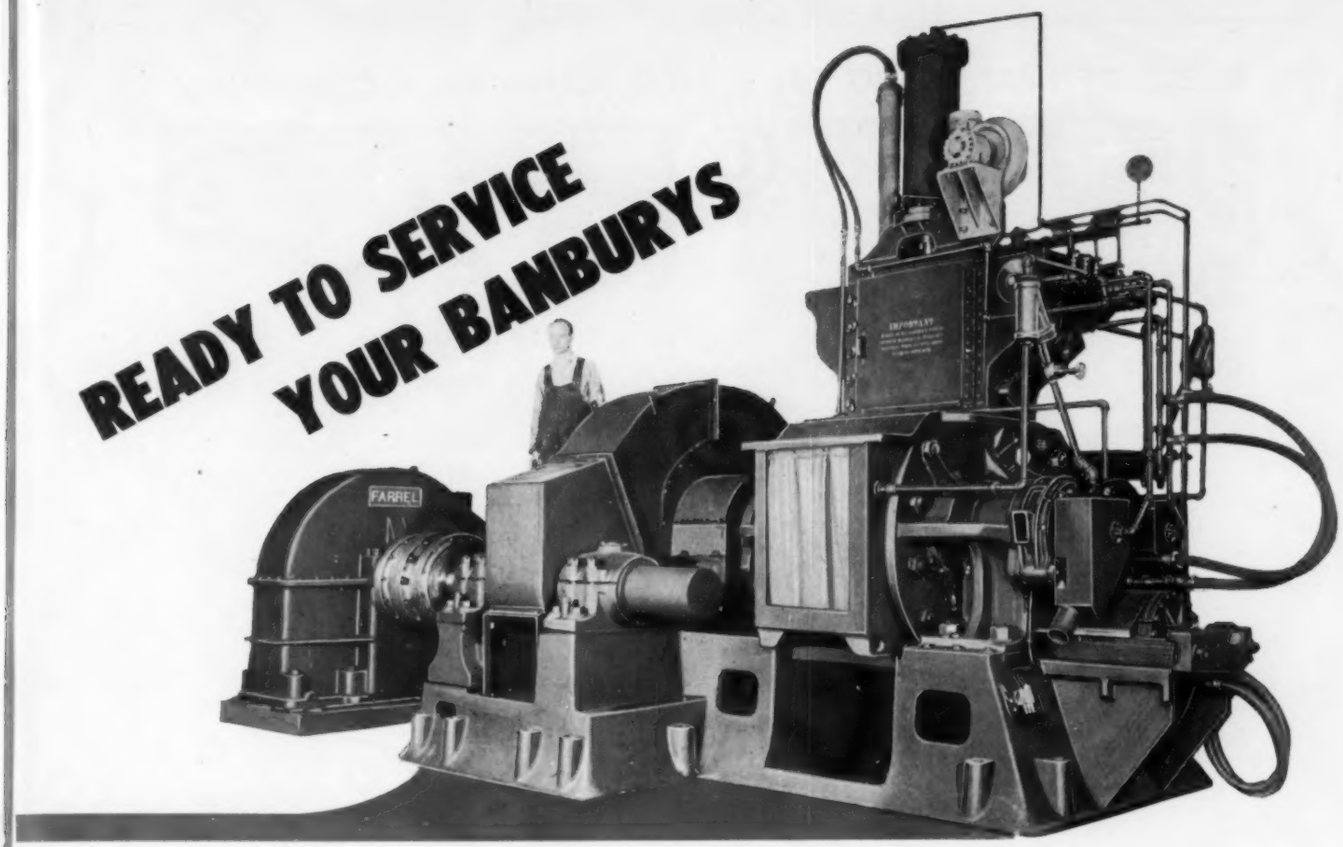
HERE ARE WALTER TAYLOR AND JOE COLLINS

IN THE AKRON AREA
Write, wire or 'phone

FRANCIS J. COLLINS
FARREL-BIRMINGHAM COMPANY, INC.
2710 First Central Tower
AKRON 8, OHIO
Phone JEFFERSON 3149

Started with Farrel-Birmingham nineteen years ago. Served four years as a machinist apprentice, then worked as a general machinist for ten years. Has been a Banbury Mixer erector and service man for the last five years.

READY TO SERVICE YOUR BANBURYS



These expert service men have the knowledge and experience to diagnose the cause of Banbury Mixer troubles and can make adjustments and minor repairs on the spot, to keep your machines in production. They are also prepared to make periodic examinations of your Banburys—a service that may avert the need for major repairs.

When a major repair job is the only solution, they can arrange for the return of the entire mixer body to our plant, where it will be completely overhauled and needed repairs and replacements made.

Both of these men know the Banbury inside and out . . . from hopper to discharge door . . . from drive to recording device. Both understand the basic design principles of the machine, and they have back of them the resources, facilities, knowledge and experience of the organization which is responsible for bringing the Banbury to its present state of development.

When you need help—call for the man located in your territory. He is at your service—ready to service your Banburys.

Why

Farrel-Birmingham

should handle your Banbury Repairs

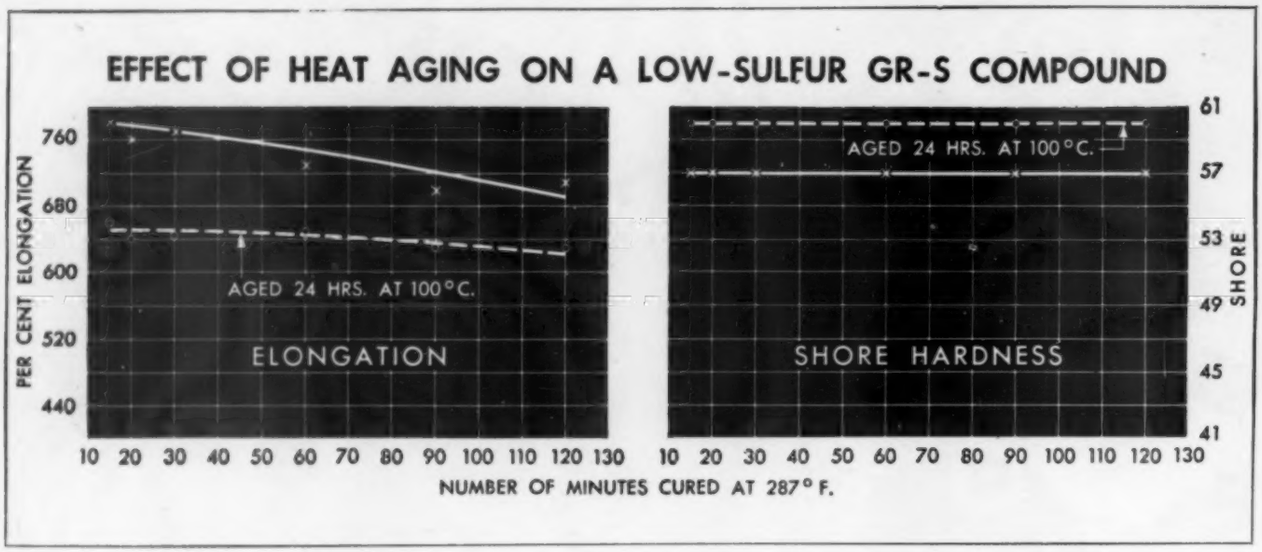
In making use of our facilities, you will know that repairs are being made by:

1. **The developer and manufacturer of the Banbury Mixer**
2. **The only company which has complete drawings showing original dimensions**
3. **The only company having the necessary jigs and fixtures**
4. **The only company with an adequate knowledge of Banbury requirements**

FARREL - BIRMINGHAM COMPANY, Inc.

ANSONIA, CONN.

PLANTS: Ansonia and Derby, Conn., Buffalo, N. Y • SALES OFFICES: Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles



Physical Properties of GR-S Compounds Stay Put with New Low-Sulfur Formula

Heat resistance now made practical by F.B.S LITHARGE

FORMULA

GR-S (Institute)	100
E.P.C. Carbon Black	40
Sulfur	0.75
Zinc Oxide	3.0
Benzothiazyl Disulfide	1.0
F.B.S. Litharge	1.5
Coaltar softener	5

Data:

Time 287° F.	Tensile Strength	% Elong.	Modulus 300% Elong.	Shore Hardness
15	2890	780	640	57
20	3010	760	660	57
30	3090	770	660	57
60	2960	730	660	57
90	2850	700	685	57
120	2960	710	700	57
Aged 24 Hours at 100° C				
15	2970	660	980	60
20	3030	640	1020	60
30	2980	645	1000	60
60	3260	650	1040	60
90	3060	630	1130	60
120	2930	630	1040	60

OUTSTANDING CHARACTERISTICS:

The F.B.S. Litharge-thiazole combination used with low sulfur is characterized by the following:

1. Heat stability • **2.** Fast curing rate • **3.** High flat modulus **4.** Excellent general physical properties • **5.** Processing safety **6.** Efficiency • **7.** Economy.

High retention of physical properties . . . how important is that to you?

Your GR-S can have it, merely by changing to a low sulfur formula.

Now such a compound can be cured in a practical time and without extra quantities of accelerator.

F.B.S. Litharge plus benzothiazyl disulfide is what produces safe, fast cures with low sulfur content.

The curing period can be varied from 15 to 120 minutes with scarcely any effect on elongation, hardness or modulus.

Moreover, the effect of aging on samples cured for various periods is almost uniform.

Reference to the accompanying tables and charts should be convincing.

• • •

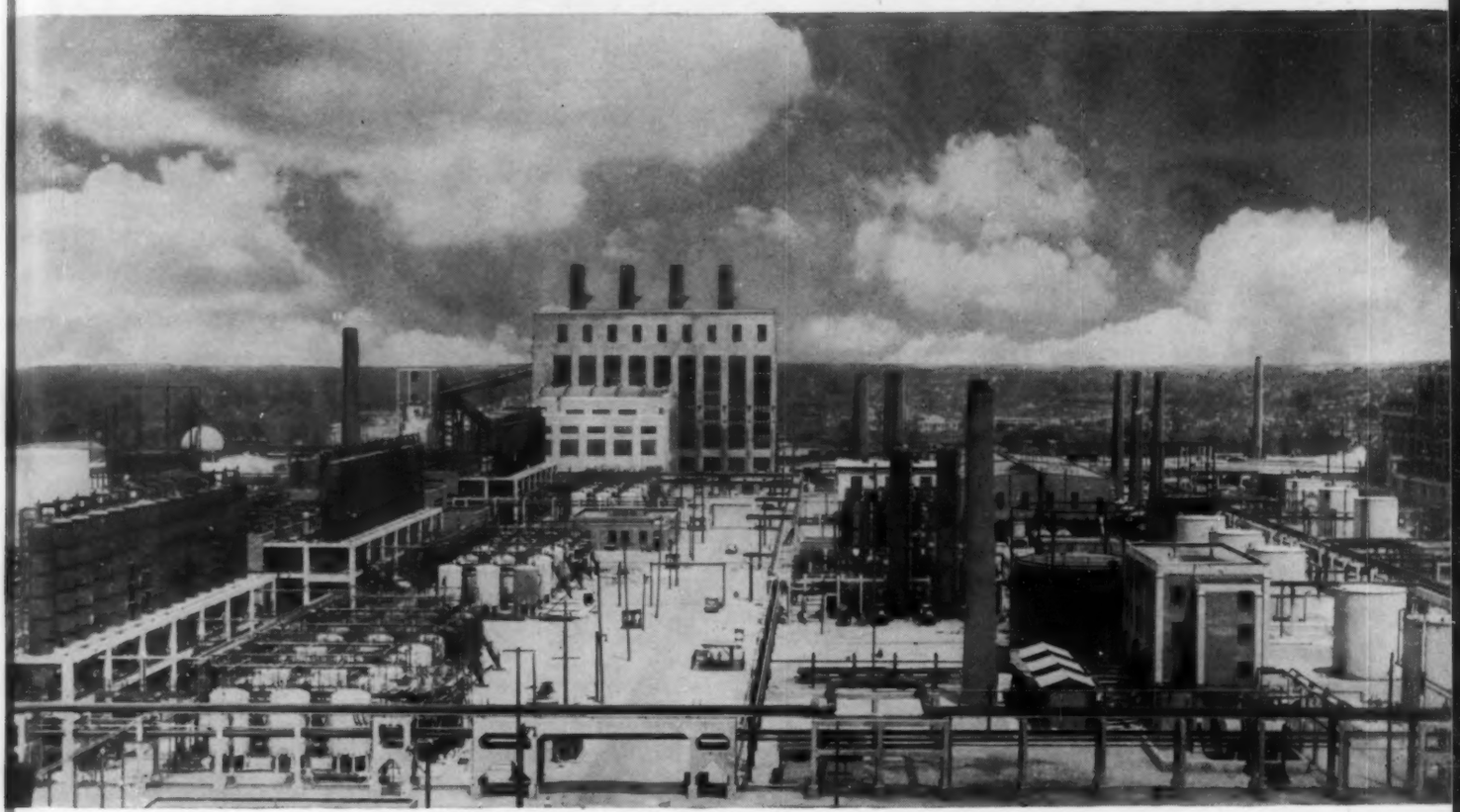
Ask us to send you a printed report, "Compounding of GR-S for Heat Resistance," issued by the Rubber Division of our Research Laboratories, which covers the subject of F.B.S. Litharge for low sulfur formulas in greater detail and from a number of additional angles. Write to

NATIONAL LEAD COMPANY

Rubber Division: 105 York Street, Brooklyn, N. Y.

New York, Buffalo, Chicago, Cincinnati, Cleveland, St. Louis, San Francisco; Boston (National-Boston Lead Co.); Pittsburgh (National Lead & Oil Co. of Penna.); Philadelphia (John T. Lewis & Bros. Co.).

Here's what Koppers has done on synthetic rubber chemicals



Koppers reports to the nation on Kobuta's first year's production of Synthetic Rubber Chemicals

The 200-acre Kobuta Plant built and operated by Koppers for the Government—producing butadiene and styrene—is one of the largest synthetic rubber chemical operations in America.

A year ago last July, its first butadiene was shipped. Now the plant makes more butadiene in one day than it did in that historic first month, and it makes great quantities of styrene as well.

In July, 1943, only one unit was operating. By October, three were in operation. That month Kobuta manufactured more butadiene than the designed rating of all four units. Since completion of the last unit in December, butadiene output has exceeded 150% of rated capacity.

Although only one unit has been in operation a full year, the butadiene production during the first 12 months equaled 120% of the 80,000-ton rated capacity.

Kobuta is also producing styrene in excess of its rated capacity of 37,500 tons per year.

These important synthetic rubber chemicals are processed by the rubber companies into tires and other products for the war and for you.

Approximately 30,000,000 standard tires per year can be produced from Kobuta's butadiene and styrene.

.....

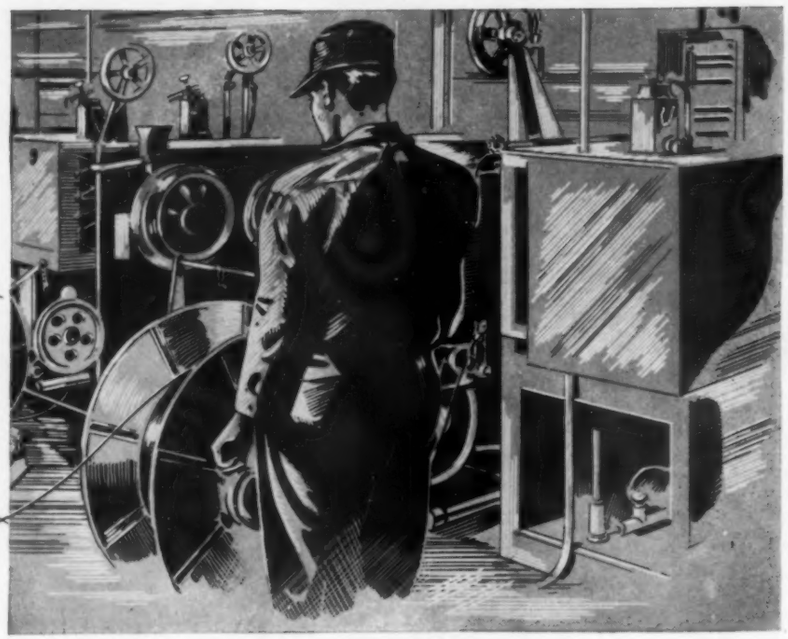
AN ACKNOWLEDGMENT:

Koppers acknowledges the help of those who contributed to this great record, including other chemical companies who made processes available to us; manufacturers, engineers and contractors whose equipment, services and "know how" helped in Kobuta's construction; labor which provided thousands of workmen for this giant project, and government agencies, cooperating with educational institutions, which organized special chemical training programs. Koppers United Company, Pittsburgh 19, Pennsylvania.

KOPPERS

The Industry that serves all Industry

An old idea, with a new twist in the WIRE BUSINESS...



A CATALOG that lists and describes National-Standard's steel wires, braids and tapes couldn't possibly picture the policies of the company. We believe these policies are as important as the products our company produces.

Many years of experience in the rubber industry has taught us that all customer problems cannot be treated alike—individual requirements cannot always be met with a fixed line of products and specifications.

The men of National-Standard have much deeper interests than mere catalog-type of selling. Their responsibilities do not end with the delivery of a product.

These men are constantly working with tire and hose engineers and mechanical goods men to not only improve their own products, but also those of the customer and to also find new and better methods of application.

It is this kind of cooperation and personalized service, and the willingness to be helpful that has built for National-Standard a reputation with the rubber industry as a reliable source for research and engineering assistance as well as for quality products.

If you've got a problem to solve, or an idea requiring a new use of steel wire, braids or tapes for rubber reinforcement, National-Standard's experienced engineering staff is ready to serve you.

NATIONAL STANDARD Company

Divisions of National-Standard Company

NATIONAL-STANDARD
Niles, Mich.
TIRE WIRE, FABRICATED BRAIDS AND TAPE

ATHENIA STEEL
Clifton, N. J.
COLD ROLLED, HIGH-CARBON SPRING STEEL

WAGNER LITHO MACHINERY
Hoboken, N. J.
LITHOGRAPHING AND SPECIAL MACHINERY

WORCESTER WIRE WORKS
Worcester, Mass.
ROUND STEEL WIRE, SMALL SIZES

BACK THE ATTACK—BUY MORE WAR BONDS

Calcene T and Silene EF

Solve many GR:S problems

These Columbia pigments have proved of value in products requiring special qualities in GR:S stocks. Here are just a few examples:

Wire Insulation . . .

Problem—to produce GR:S stocks having the necessary tensile strength.
Answer—Calcene T, readily dispersible in GR:S, confers tensile strength meeting specifications for many wire insulation stocks.

No-Mark Soles and Heels . . .

Problem—to provide GR:S soles and heels which will not mark floors.
Answer—Silene EF *and* Calcene T make a highly satisfactory no-mark sole and heel stock.

Inner Tubes . . .

Problem—to improve retention of elongation and minimize box cracking in GR:S.
Answer—Silene EF in GR:S confers these qualities, resulting in greatly improved inner tubes.

These uses may suggest possibilities for either or both Calcene T and Silene EF in GR:S stocks for your products. We shall be glad to furnish information at your request.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING · PITTSBURGH 19, PA.

CHICAGO · · · BOSTON · · · ST. LOUIS · · · PITTSBURGH · · · NEW YORK · · · CINCINNATI
CLEVELAND · · · PHILADELPHIA · · · MINNEAPOLIS · · · CHARLOTTE

COLUMBIA SPOTLIGHT

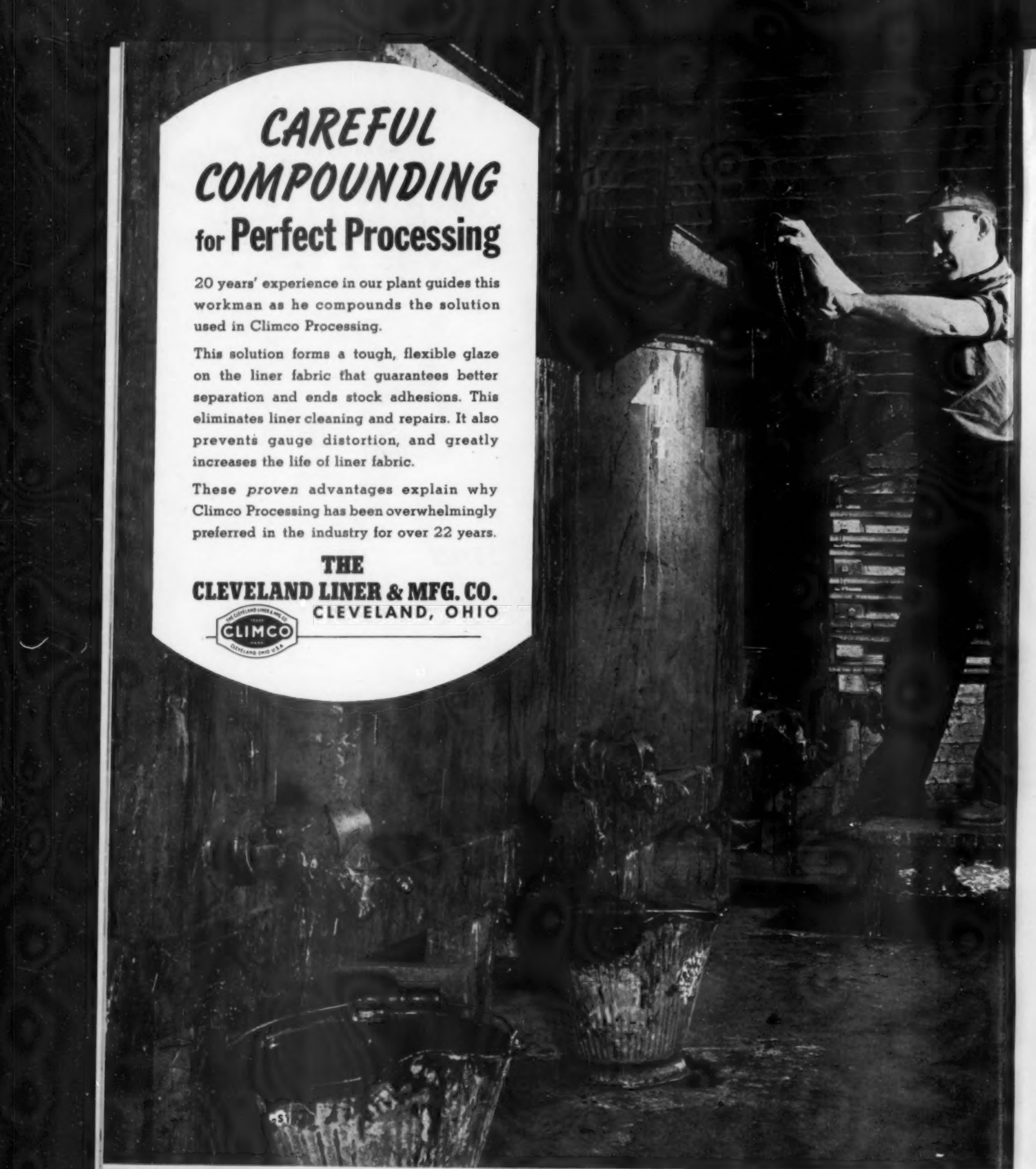
UNUSUAL STRENGTHS are among the numerous advantages obtained in Columbia's new thermosetting plastic, Allymer. Other points of superiority are its resistance to heat, crazing and marring . . . form stability . . . resistance to weather and to solvents, as proved in various critical war materials. Allymer is now available in sample quantities for experimental purposes. You may have research reports and other free data by writing.

ONE FOR RIPLEY—A recent shipment of 60,000 cases of bottled beer to the South Pacific traveled 9,000 miles with the breakage of only 27 bottles! This remarkable packaging achievement of the Glass Container Industry focuses attention on its splendid wartime record. Among the many products destined for export in glass to our fighting men overseas, 1944 requirements call for 678,800,000 beer bottles . . . 50,000,000 bottles for water purifier tablets . . . 98,600,000 insect repellent bottles!

PIG IRON production gets a big boost when high sulphur content can be reduced. Soda Ash has the stuff, chemically, to do it—but the problem is to bring it into sufficient surface contact with the molten iron. Columbia solves it with its Soda Briquettes—compressed pellets composed chiefly of Soda Ash. Added to the ladle at the time the pigs are cast, Soda Briquettes get the surface contact necessary for effective desulphurizing—and reduce expensive dusting losses. A newly prepared folder will be furnished on request.

SODA ASH production records illustrate the tremendous Twentieth Century growth of the nation's chemical industry. A basic chemical for the Glass industry, Soda Ash is also used extensively by the Textile and Paper industries and serves in a wide variety of cleansing operations. In a single month, total U.S. production of Soda Ash now approximates that for the entire year of 1899 . . . and Columbia's own annual production exceeds that tonnage by a substantial margin.

COLUMBIA CHEMICALS include Soda Ash, Caustic Soda, Sodium Bicarbonate, Liquid Chlorine, Silene EF (Hydrated Calcium Silicate), Calcium Chloride, Soda Briquettes, Modified Sodas, Caustic Ash, Phosflake, Calcene T (Precipitated Calcium Carbonate) and Calcium Hypochlorite



CAREFUL COMPOUNDING for Perfect Processing

20 years' experience in our plant guides this workman as he compounds the solution used in Climco Processing.

This solution forms a tough, flexible glaze on the liner fabric that guarantees better separation and ends stock adhesions. This eliminates liner cleaning and repairs. It also prevents gauge distortion, and greatly increases the life of liner fabric.

These *proven* advantages explain why Climco Processing has been overwhelmingly preferred in the industry for over 22 years.

THE CLEVELAND LINER & MFG. CO.
CLEVELAND, OHIO

CLIMCO

CLIMCO PROCESSED LINERS
for Faster, Better Production at Lower Cost

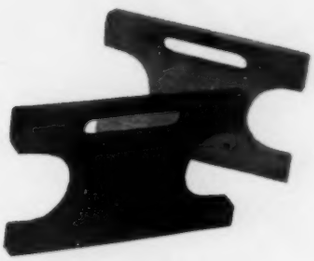
LINERETTE
INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

Couldn't BE DONE

YET HERE IT IS . . .

WRINKLE FINISH WOOD? Couldn't be done because it would bleed rosin on baking—

Yet **WRINKLE** is now used on wooden radio cabinets, instrument cases and similar articles previously made of metal.

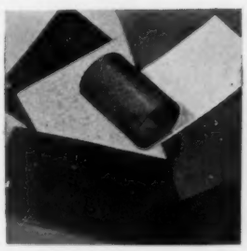


WRINKLE FINISH PRESSED PULP, CELLOTEX or MASONITE? Couldn't be done because they are too porous—

Yet **WRINKLE** is now used on clock cases, insulating blocks, partitions, panelling, etc.

WRINKLE FINISH PAPER or FABRIC? Couldn't be done because they were too absorbent and the surface would crack—

Yet **WRINKLE** is now widely used for wrapping and decorative paper and fabrics for innumerable applications.



WRINKLE FINISH RUBBER? Couldn't be done because it would not stand bending or would chip off—

Yet **WRINKLE** is now being used on bicycle splash guards and many other rubber products.

Billy Wrinkle Says "For a better understanding of WRINKLE and its far reaching effect, subscribe to 'New Wrinkles in Finishing'. It is free."

NEW WRINKLE INC.

314 W. FIRST ST. • DAYTON 2, OHIO

"Wrinkle", "Billy Wrinkle" and "New Wrinkle" are registered trademarks of New Wrinkle, Inc.

Just in case you've eased up... ON YOUR PAY ROLL PLAN

Pause one brief moment. Compare your lot—and that of the men and women in your employ—with the lot of the infantrymen who meet the enemy face to face, who do the hardest fighting, who suffer the most casualties.

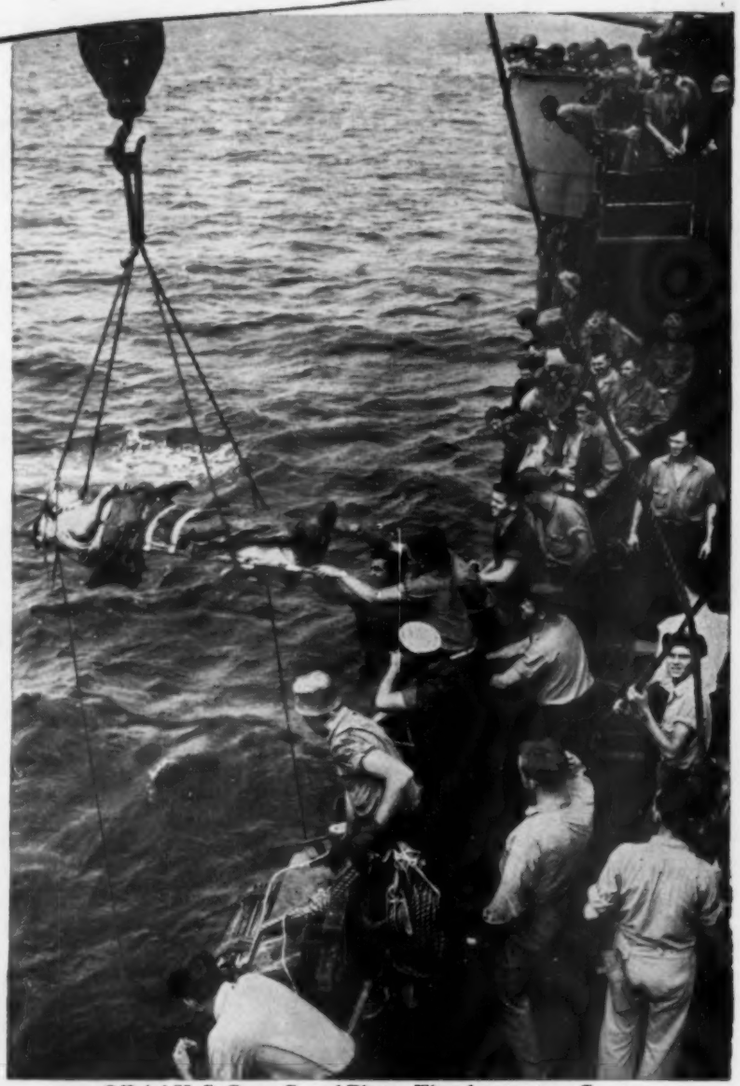
Let the full impact of war's unending grimness swiftly convert any tendency toward complacency into revitalized urgency. Remember—the war is not yet won.

As top management and labor, you've been entrusted with two major responsibilities—steadily maintained production, and steadily maintained War Bond Sales *through your Pay Roll Savings Plan.*

Decide *now* to revitalize your plant's Pay Roll Plan. Have your Bond Committee recheck all employee lists for percentages of participation and individual deductions. Have Team Captains personally contact each old *and new* employee. Raise all percentage figures wherever possible.

Don't underestimate the importance of this task. This marginal group represents *a potential sales increase of 25% to 30% on all Pay Roll Plans!*

Your success will be twofold: A new high in War Bond Sales; and a new high in production. Because a worker with a systematic savings plan has his mind on his work—not on post-war financial worries. He's taking care of the future now. His own. And his Country's future. *Help him!* REVITALIZE YOUR WAR BOND PAY ROLL SAVINGS PLAN.



Official U. S. Coast Guard Photo: The elevator to a Coast Guard-operated transport hospital

Back the Attack!
SELL MORE THAN BEFORE!

The Treasury Department acknowledges with appreciation the publication of this message by

THE RUBBER AGE

This is an official U. S. Treasury advertisement—prepared under the auspices of Treasury Department and War Advertising Council.

NET WEIGHT 50 LBS.
IXIE 40 DIXIE
UNITED CARBON COMPANY Inc.
DIXIE 40
DUSTLESS CARBON BLACK
U.S.A.
IXIE 40 DIXIE
MADE IN U.S.A.
PATENTS APPLIED FOR

DIXIE 40

This latest furnace-process reinforcing carbon black (HMF type) for synthetic and natural rubber possesses a combination of most desirable characteristics—

- cool mixing
- easy processing
- smooth and rapid extrusion
- fast rate of cure
- full reinforcement
- low heat build-up
- high resiliency
- high resistance to cut growth, flex cracking and abrasion.

Dixie 40 is especially useful for tires of all types, pneumatic or solids, under any conditions; tubes, bogie wheels; footwear; and mechanical goods.

Try a 50-50 blend of Dixie 40 and channel black for tread stock to secure better plasticity. It will make it possible for you to dispense with one milling and thus—which is so important now—INCREASE YOUR OUTPUT.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston, West Virginia

NEVILLE

NEVILLE CHEMICALS

Serving the RUBBER INDUSTRY

NEVOLL*

Coal-tar softener, formerly widely used in natural rubber, now found to be an effective plasticizer and wetting agent for GR-S to improve resistance to abrasion, tensile strength, elongation and resilience.

COUMARONE RESINS

A number of Rubber Reserve Company's releases on compounding synthetic rubbers contain suggested recipes calling for coumarone resins. They are available in various melting points and colors.

DIBUTYL PHTHALATE

Effective softener for several of the synthetic rubbers, such as Hycar OR, Perbunan, etc., imparting high tensile, low modulus and low set.

RECLAIMING OILS

Several types manufactured for both digestor and pan processes.

COAL-TAR SOLVENTS

Benzol, Tollac* Solvent, Nevsol*, Xylol, 2-50-W* Hi Flash Solvent, Cosol*, and special solvents; for rubber cements and various rubber solutions.

R-9

*Reg. U. S. Pat. Off.

THE NEVILLE COMPANY

PITTSBURGH · PA.

Chemicals for the Nation's War Program

NEVILLE SALES AGENTS TO THE RUBBER INDUSTRY

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CHARLES T. WILSON CO., INC.

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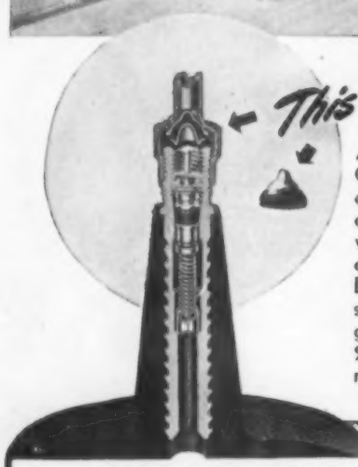
THIS?



All Standard Schrader Valve Caps contain this specially designed sealing unit with a dome-shaped rubber washer vulcanized between two dome-shaped BRASS plates. Because of their unique construction, these caps are guaranteed airtight up to 250 lbs. pressure. This mighty midget does the work.

MR. & MRS. AMERICA

A flat or underinflated tire on the road today may mean no car to drive tomorrow. Don't let this happen to you. Check your tires now. Are they properly inflated? Is there a cap on each tire valve? Airtight Schrader valve caps are available in the familiar red, white and blue package wherever gas or tires are sold—or tires are serviced.

Schrader
CONTROLS THE AIR

You wouldn't use a donkey if your tires gave out? Perhaps not—but if you couldn't get new tires, you wouldn't drive your automobile either. And actually the situation is that serious. No new tires are in prospect for most of us for a long time. Therefore, if you want to keep on driving, be sure your tires are properly inflated NOW—for underinflation ruins tires.

The easiest and most effective way to prevent costly, destructive tire wear is to keep your air pressure up—for a 6.00 x 16 tire underinflated only 6 lbs. (as an example) loses 30% of its mileage. The remedy is simple. Put air in. Keep air in. Be sure that every tire valve has a Schrader tire valve CAP to *seal* that air in. Screwed down fingertight, these caps prevent leakage through the valve mouth. And—remember—it's that last turn that makes the absolute seal.

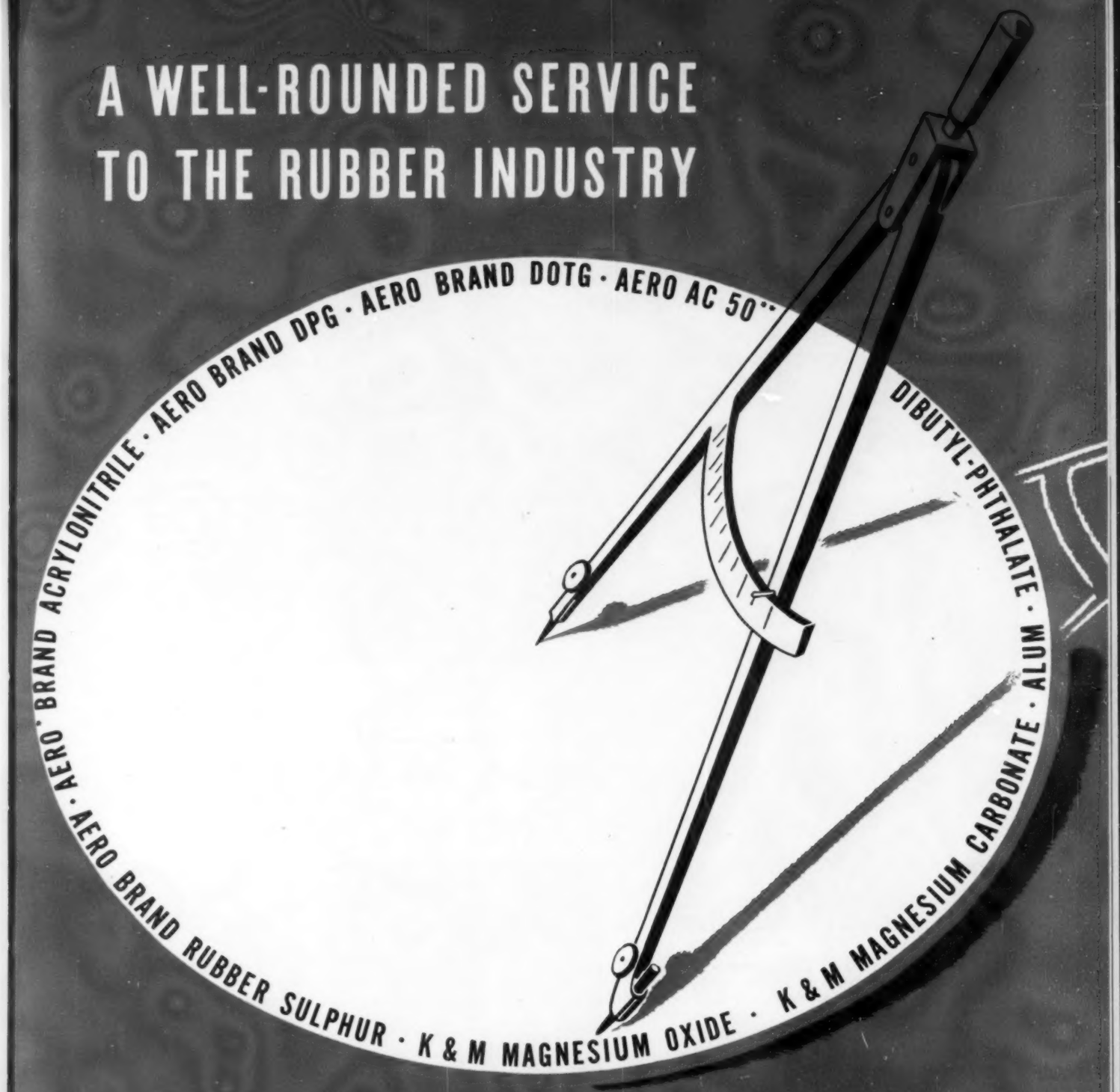
NEXT TIME YOU GET GAS

Get Air—Get AIRTIGHT CAPS

SOLD EVERYWHERE

A. SCHRADER'S SON, ***Division of Scovill Manufacturing Company, Incorporated,*** **BROOKLYN, NEW YORK**

A WELL-ROUNDED SERVICE TO THE RUBBER INDUSTRY


AERO BRAND DOTG · AERO AC 50**
DIBUTYL-PHTHALATE · ALUM
K & M MAGNESIUM CARBONATE
K & M MAGNESIUM OXIDE
AERO BRAND RUBBER SULPHUR
AERO BRAND ACRYLONITRILE · AERO BRAND DPG

Cyanamid's "controlled quality" production of chemicals for the rubber industry is the key to the dependability of these materials which is helping to maintain fast and economical processing schedules for the war effort and essential civilian uses. This, coupled with the strategic locations of Cyanamid warehouses, assure quick deliveries of quality chemical supplies to all centers of the rubber industry.

SALES REPRESENTATIVES TO THE RUBBER INDUSTRY AND STOCK POINTS:

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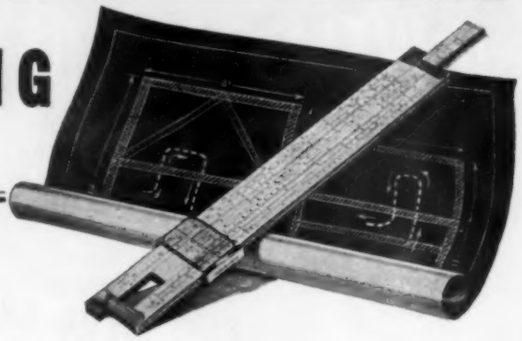
Herron & Meyer
CHICAGO, ILL.

Akron Chemical Co.
AKRON, OHIO

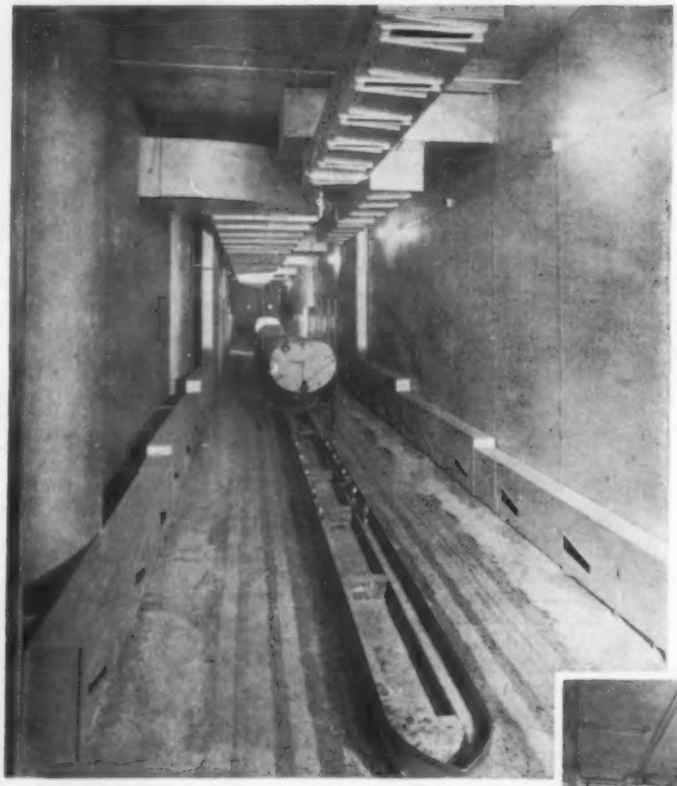
AMERICAN CYANAMID
& CHEMICAL CORPORATION
(A Unit of American Cyanamid Company)
30 ROCKEFELLER PLAZA . NEW YORK 20, N. Y.

Reg. U. S. Pat. Off.

OVEN ENGINEERING NEWS



Bulky, Built-up Assemblies Processed Efficiently in Seven-Alley Automatic Oven



One of the difficult problems encountered in production of self-sealing aircraft fuel tanks has been that of rapidly curing the laminations of the tanks. In the past, this has been a slow, time-consuming task, lagging behind other operations.

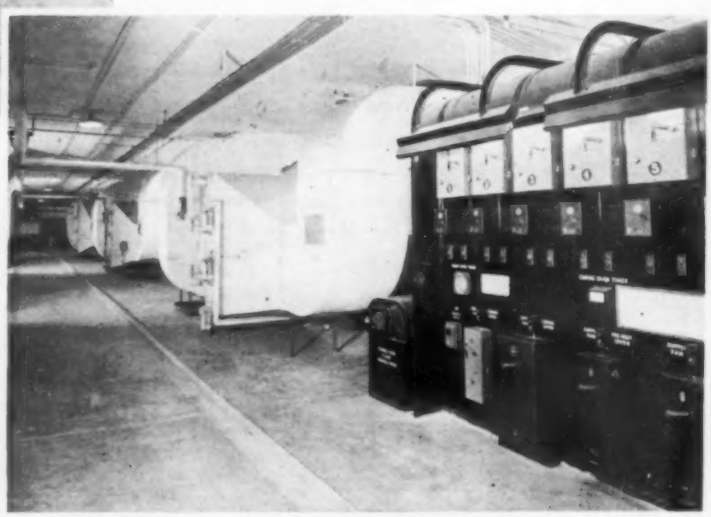
Solution of the problem has been achieved for the B. F. Goodrich Company by the installation of a three-compartment, seven-alley conveyerized oven, which cures, preheats and bakes paint finishes on fuel cells in close coordination with fabricating processes.

The post-war possibilities of this and similar Industrial Oven Engineering Company installations are enormous. For instance, the curing of large plywood assemblies for aircraft, furniture, housing, etc., and the processing of laminated thermosetting plastic structures can be stepped up considerably by such a system, regardless of shape or bulk. The unusual flexibility of the oven is indicated by the special design of the floor-type pusher conveyor, which admits trucks of any wheel width within the dimensions of the alleys.

To assure the close temperature limits required by fuel cell processing, low-velocity supply ducts are installed along the entire length of each alley. (These may be seen in the illustration at the left, which shows completed cells passing through the preheating alley preparatory to finishing, or in the curing room illustration of our advertisement in the July issue of this publication.) Temperature in the entire system is guaranteed to $\pm 5°$, and tests have shown actual variation of only $\pm 3°$.

Maintenance of a low relative humidity rate is achieved by exhaust ducts installed the length of the alley at the entering end of the system. If processing requires it programme humidity control can be utilized. Recirculation ducts throughout the oven constantly return air to the heating systems for reheating. Each compartment has its own heating system, and these three systems (shown in the lower photograph, with part of the main control panel) deliver a total of 160,000 cubic feet of heated air per minute.

For additional information on this installation, we suggest that you check our July advertisement, and if you have a problem of your own which involves oven processing, drop us a line and let us know what it is. The Industrial Oven Engineering Company designs and builds a great variety of oven materials handling systems for many industries.



(This is No. 12 of a series. Reprints of previous advertisements will be sent free upon request.)

ENGINEERING VERSATILITY

THE INDUSTRIAL *Oven Engineering* COMPANY

11621 DETROIT AVE., CLEVELAND 2, OHIO

Engineering Representatives in Principal Industrial Areas

★ ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON, W. 1, ENGLAND ★

. . . Uniformity, too in the Quality of Production

Nature's mass production of uniform quality begins in the roots of the tree . . . Superior flavor and coloring of fine fruit are like the serviceability and attractiveness of a manufactured product. Basic requisites to the perfection of results go in at the beginning. . . And so it is today in the mass production of innumerable products, RESINEX has been one of the most helpful parts in the formulations that have given better product performance, better appearance and desirable uniformity. RESINEX extends and plasticizes GR-S compounds. It gives smoothness for better extrusion; it gives greater tensile and elongation, greater resistance to oil, greater resistance to tear and abrasion. It is low in cost, too.

RESINEX

Write for Laboratory Facts and samples

STANDARD *Chemical Company*

General Offices: AKRON 8, OHIO

BUNA COMPOUNDS

for BONDING, COATING and IMPREGNATING

(Cured and non-cured stocks)

Longtime specialists in the fields of Combining, Coating and Impregnating Compounds, the UBS Laboratories are ideally set up to develop the particular Buna Compounds your operations require. The UBS Laboratories not only know thoroughly the compounding advantages and limitations of all the latest synthetics (Neoprene, Hycar, Buna, Vinylite, etc.), but even have developed an original synthetic latex and synthetic rubber of their own. *Write today, describing your Bonding, Coating and Impregnating Problems.*

Address all inquiries to the Union Bay State Chemical Company, Rubber Chemicals Division, 50 Harvard Street, Cambridge 42, Massachusetts.

UBS

UNION BAY STATE
Chemical Company

Serving Industry with Creative Chemistry

ORGANIC CHEMICALS · SYNTHETIC LATEX · SYNTHETIC RUBBER
PLASTICS · INDUSTRIAL ADHESIVES · DISPERSIONS
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There is no Monopoly on

SKILL

. . . Specialized Study and Experience give him the *"Know-How"*

. . . He never manufactured a typewriter, but his skill and knowledge has maintained and restored the efficiency of hundreds of these critical instruments for the Rubber Industry. . . And, so, also, STUDY and EXPERIENCE with Mixers in the heart of the Rubber Industry have given us the skillful *"Know-How"* and ability to rebuild Banburys for greatest efficiency . . . The leaders in the Industry know that our *Responsibility* means to back up every job we do with the guarantee of satisfaction.

SERVING THE RUBBER INDUSTRY

IWS

INTERSTATE WELDING SERVICE

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EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

MEETING THE MEASURE OF YOUR PROCESSING REQUIREMENTS

WITCO BLACK #12 ... an extremely easy processing black of lower hysteresis than standard channel blacks. It is readily compounded without affecting the tensile, modulus or elongation, and is being used with highly satisfactory results in natural, synthetic and reclaim rubber processing. Witco Black No. 12 is a product of exceptionally uniform particle size, produced under rigid control at the Witco Panhandle Plant. It may be the solution to your compounding problem. Why not talk it over with one of our technical representatives?

WITCO CHEMICAL COMPANY MANUFACTURERS AND EXPORTERS

[FORMERLY WISHNICK-TUMPEER, INC.]

295 MADISON AVENUE, NEW YORK 17, N. Y. • BOSTON • CHICAGO • DETROIT • AKRON • CLEVELAND • LONDON

Technical Bulletin No. 2

The Compounding of GR-S with Substantial Loadings of Zinc Oxide

THE results with Mercaptobenzothiazole, as shown in our last Technical Bulletin, may be further improved — especially with respect to pendulum rebound (hysteresis) and heat generation—by increasing the major accelerator, and employing a secondary accelerator with the sulfur content reduced slightly.

Extra Light Calcined Magnesia and "Cumar MH 2½" remain important constituents of the compound, although evidence is accumulating that the former may be reduced still further and the latter may be replaced with other materials.

COMPOUND No. 2	
GR-S	100.0
Sulfur	3.5
Mercaptobenzothiazole	1.75
D.O.T.G.	0.15
E.L.C. Magnesia	5.0
Cumar MH2½	7.5
Zinc Oxide*	100.0

*Kadox Black Label-15 was used in this compound. Other brands of Zinc Oxide may be substituted with corresponding results. Some adjustment in the accelerator — sulfur ratio may be required in the case of a slow-curing brand (XX Red 4). More data on this subject will be available later.

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength Lb./Sq. In.	Per Cent Elongation	Load (Lb./Sq. In.) For Elongation of		Permanent Set
			200%	300%	
7.5	1120	335	600	920	.09
15	1320	335	600	1080	.11
30	1195	320	700	1070	.11
45	1110	310	635	1070	.07
60	1170	325	685	1050	.07
90	1240	310	680	1120	.09
120	1050*	425	285	445	.14
180	1020*	370	415	680	.10

*The data for the 120 and 180 minute cures were obtained about a week after the initial results on remilled stock. This may account for the erratic elongation and modulus data.

Time of Cure Min. at 45 Lb.	Shore Hardness	Goodyear-Healy Pendulum		Compression Fatigue (Goodrich Flexometer)*					Cut-Growth Resistance Inches Failure at 13,000 Cyc.
		Indentation in mm.	Per Cent Rebound	Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression		
							Initial	Final	
90	52	8.00	66.4	19.3	15'-2.5	11.9	11.3	11.9	0.71

*Test Conditions: 100 Lb. Load. 0.15" Stroke. 100°C. Oven Temp.

This compound has a much more advanced "state-of-cure" than Compound 1 as indicated by the Elongation and Permanent Set which is reflected in a 12% increase in Pendulum Rebound and a reduction in Temperature Rise in the Goodrich Flexometer of 8°C., but the cut-growth resistance has been impaired. Tight cures, of course, tend to improve hysteresis and heat generation and affect cut-growth adversely. It is necessary under such circumstances to compromise, depending on the relative importance of the properties sought.

THE NEW JERSEY ZINC COMPANY

160 FRONT STREET • NEW YORK 7, N. Y.

Products Distributed by THE NEW JERSEY ZINC SALES COMPANY

NEW YORK • CHICAGO • BOSTON • CLEVELAND • SAN FRANCISCO

Serving Dependably—
Speeding Production

★

★ **ADVAN** . . . New delayed action accelerator recommended for GRS for footwear, hose covers, CV insulation, etc.

★ **ADVAGUM** . . . Synthetic thermoplastic used to assist processing of Buna N type synthetics.

★ **ADVAWET** . . . Series of powerful wetting out and emulsifying agents. Also suitable for stabilizing synthetic latices and dispersions.

★ **COPPER NAPHTHENATE** . . . Powerful mildewproofing agent. Meets all Armed Forces specifications.

★ **EXTENDER 15** . . . Extender for dibutyl phthalate and other plasticizers. Readily available.

★ **OROPLAST** . . . Sulfur reactive plasticizer for GRS.

★ **PLASTOFLEX** . . . Series of efficient plasticizer for vinyl chloride resins. Good low temperature flexibility.

★ **PLASTOFLEX 10** . . . Replacement for dibutyl phthalate in Buna N type synthetics. Gives high resilience.

★ **PLASTICIZERS VA** . . . Plasticizer for vinyl acetate polymers as replacements for latex and for shoe adhesives.

★ **PLASTAC** . . . Tackifier and plasticizer for GRS.

★ **RESIN V** . . . Tackifier for GRS, also in adhesive work with GRS latices.

★ **VISTAC** . . . Series of hydrocarbon polymers being used as tackifiers and processing aids for GRS, Vistanex Polybutene and other rubbers.

★ **ZINC NAPHTHENATE** . . . Colorless mildewproofing agent for fabrics such as duck, braid, etc. Meets government specifications.

★

ADVANCE SOLVENTS & CHEMICAL CORPORATION

245 Fifth Avenue — New York 16, N. Y.

A NEW BLACK "MAGIC"

Continex SRF

SEMI-REINFORCING FURNACE BLACK

Here at Continental's new New Furnace Black Plant, full scale production is now under way.

Continex SRF is a superior semi-reinforcing furnace type black . . . providing greater strength and loading capacity . . . giving the rubber a higher rebound resilience and longer service life.

Your orders for Continex SRF will be filled promptly.

CONTINENTAL CARBON COMPANY
MANUFACTURER
[CONTINENTAL CHANNEL AND FURNACE BLACKS]

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[FORMERLY WISHNICK-TUMPEER, INC.]

MANUFACTURERS AND EXPORTERS

295 MADISON AVENUE, NEW YORK 17, N. Y. · Boston · Chicago · Cleveland · Akron · Detroit · London

How to prevent inflation in one easy lesson

Put that money back in your pocket!

When a lot of people want the same thing, its price goes up.

Americans have more money today—much more—than there are things to buy with it.

So every big or little thing you buy—that you can possibly do without—cuts supplies and bids prices up on what is left.

Rising prices spell inflation. And every inflation has been followed by a cruel and bitter depression . . . men out of work, homes lost, families suffering.

We don't want inflation: we don't want another depression.

4 THINGS TO DO to keep prices down and help avoid another depression

1. *Don't* buy a thing you can do without.
2. *Never* pay more than the ceiling price. Always give stamps for rationed goods.
3. *Don't* take advantage of war conditions to fight for more money for yourself or goods you sell.
4. *Save.* Buy and hold all the War Bonds you can afford—to help pay for the war and insure your future. Keep up your insurance.

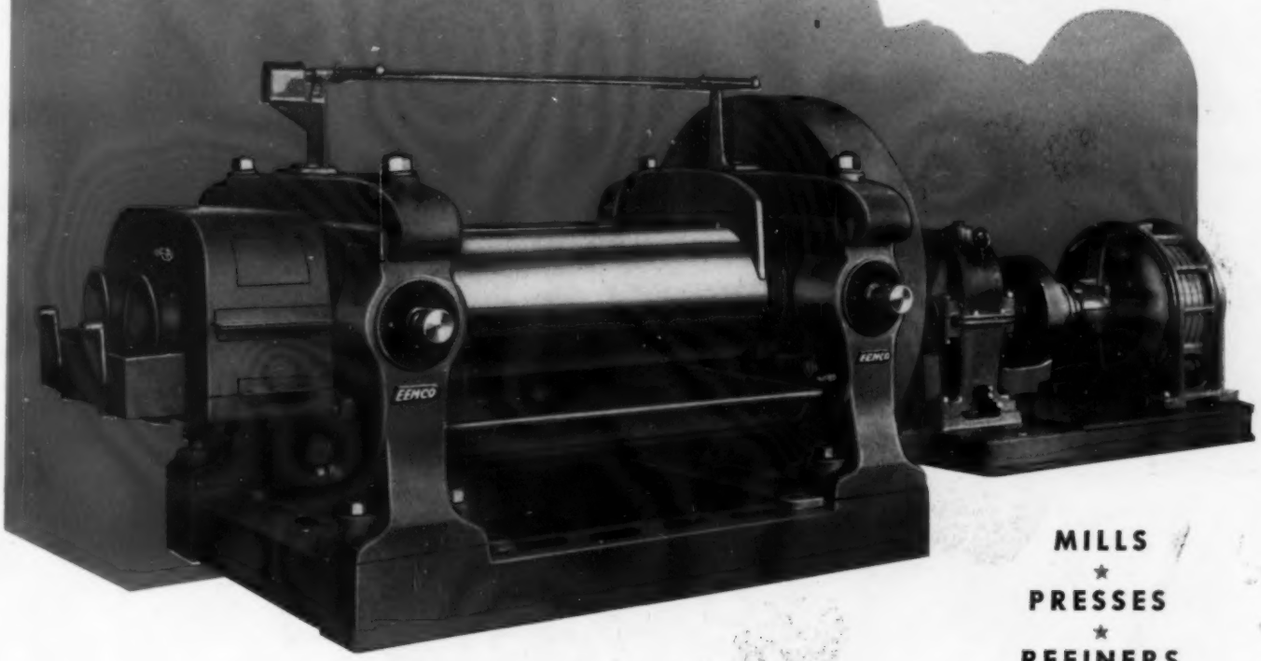
HELP US KEEP PRICES DOWN

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America.

Mills *for mixing and compounding*

ALL KINDS OF

RUBBER and PLASTICS



EEMCO has the facilities to assure exceptionally early deliveries of Rubber and Plastics Processing Machinery. Whatever your needs may be it will pay you to call on EEMCO for your requirements.

MILLS
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SUCCESSOR TO "NAGLE"

953 EAST 12th ST., ERIE, PENNA.

for **INSULATED WIRE**

Tensile Strength

Resistance to aging

Dielectric strength

Write Our Technical Service Dept. for Details

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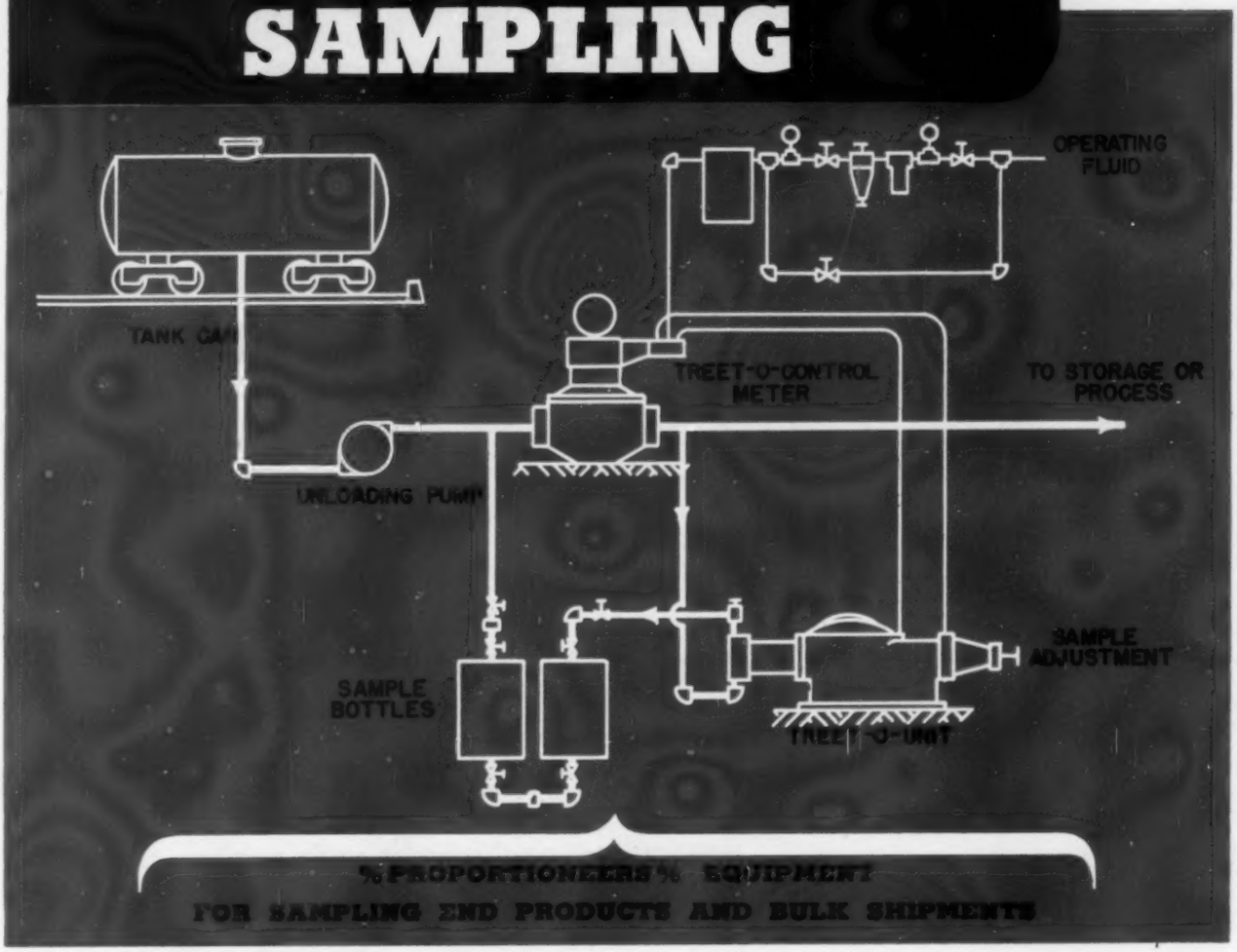
33 RECTOR STREET - NEW YORK CITY

Automatic . . . Flow Responsive

SAMPLING



Continuous sampling protects product standards, provides a check on reactions in treating operations and assures uniform products in blending. % Proportioneers Inc. % offer a meter-controlled device to deliver a cross sectional sample of total flow into a 5 gal. bomb. Samples are uniformly spaced at all rates of flow giving a quantitative and qualitative sample truly representative of all the fluid which has passed through the line.

Proportioning Equipment for Every Process Need

TREATING - **Controlled feeding of one or more reagents or treating chemicals either to a constant or variable flow of raw stock or untreated fluid in proportion to flow.**

BLENDING - **Proportioning two or more fluids or dry materials to each other at constant or varying rates and in predetermined ratio to each other.**

DILUTING - **Reducing the concentration of a solution to a predetermined final strength either at constant rate or in proportion to demand to suit process requirements.**

SAMPLING - **Removing minute quantities from a flowing stream at predetermined intervals based on rate of flow so as to produce a composite of the whole.**

Send for Bulletin 1700

% PROPORTIONEERS, INC. %

WRITE TO % PROPORTIONEERS, INC. % 66 CODDING ST., PROVIDENCE 1, RHODE ISLAND

Reclaimed Rubber

WE SPECIALIZE IN THE

SCRAP RUBBER

THAT MAKES THE RECLAIM

Associated exclusively with rubber since 1868, we have served the reclaimers since the inception of their industry. Our trained and experienced organization insures the perfect selection and grading of rubber scrap — which means satisfaction of our customers.

Our long experience and extensive facilities are at your service.

THE LOEWENTHAL CO.

JACK SIDER, *President* **J. K. McELLIGOTT,** *Exec. Vice-Pres.*

We Solicit Your Inquiries

188 W. RANDOLPH STREET
CHICAGO 1, ILL.

159 CLEWELL STREET
AKRON 5, OHIO

Cable Address: "Gyblowell"

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are designed especially for the following resins:

1. Vinyl Resins
2. Phenolic Resins
3. Alkyd Resins
4. Cellulose Resins
5. Acrylic Resins
6. Styrene Resins
7. Urea Formaldehyde Resins
8. Melamine Resins

Baker Plasticizers Contain No Phthalate

THE BAKER CASTOR OIL COMPANY

Established 1857

120 Broadway, New York 5, New York

Jersey City, New Jersey

Los Angeles, California

Bayonne, New Jersey

New Supply Just Received!

PROCEEDINGS of the RUBBER TECHNOLOGY CONFERENCE

•

This volume contains the 103 papers submitted for presentation at the International Rubber Conference held in London in May, 1938 under the auspices of the Institution of the Rubber Industry. It also includes the discussion on every paper.

The conference attracted over 500 rubber technologists from all parts of the world who were privileged to discuss what is undoubtedly the greatest collection of papers ever presented at any rubber symposium. The papers cover almost every phase of rubber technology from the growing of rubber to the marketing of the finished product. The complete list of papers, published in our June, 1938 issue, serves as an indication of the wide scope of the subjects.

Every technologist and every rubber library should have a copy of this valuable book so as to be posted on world developments in rubber technology.

Over 1000 pages—9x12 in.—Indexed—Price (postpaid), $12

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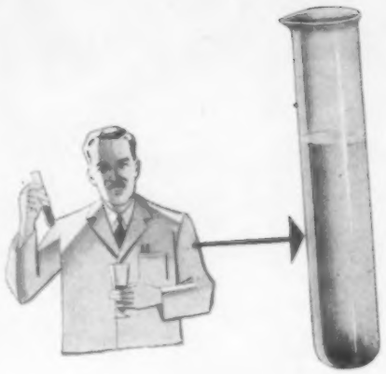

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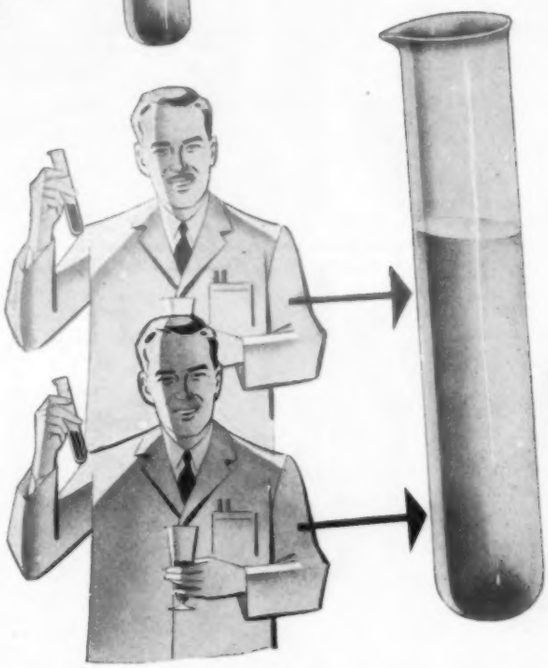

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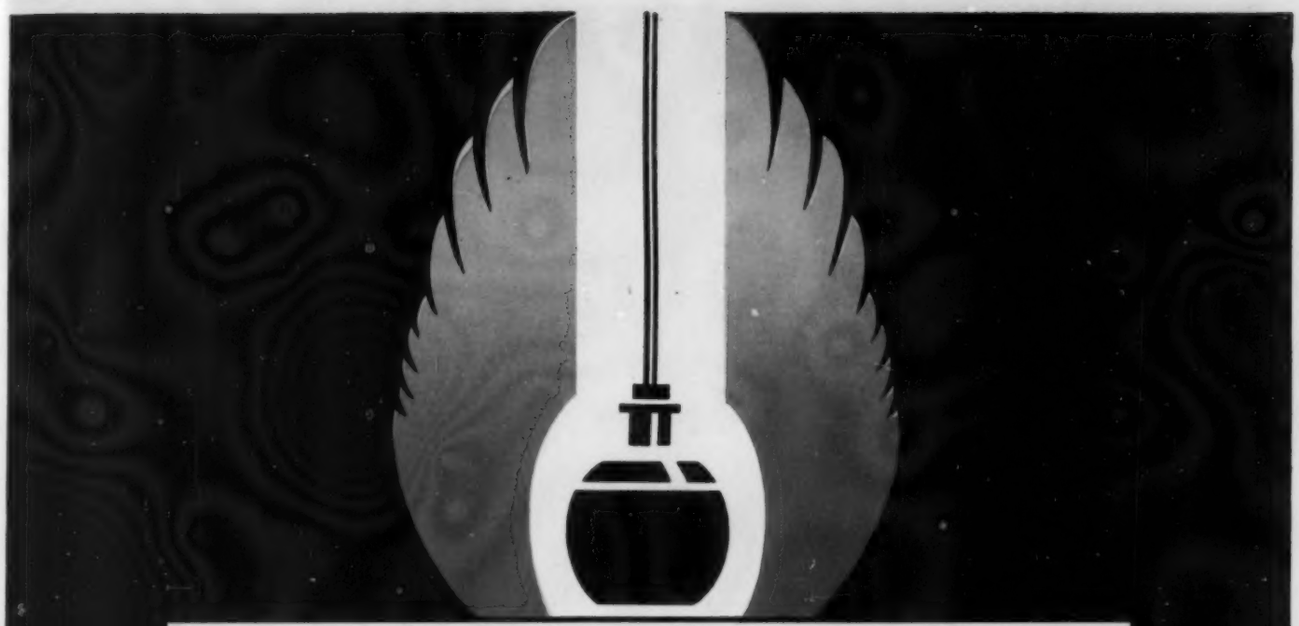

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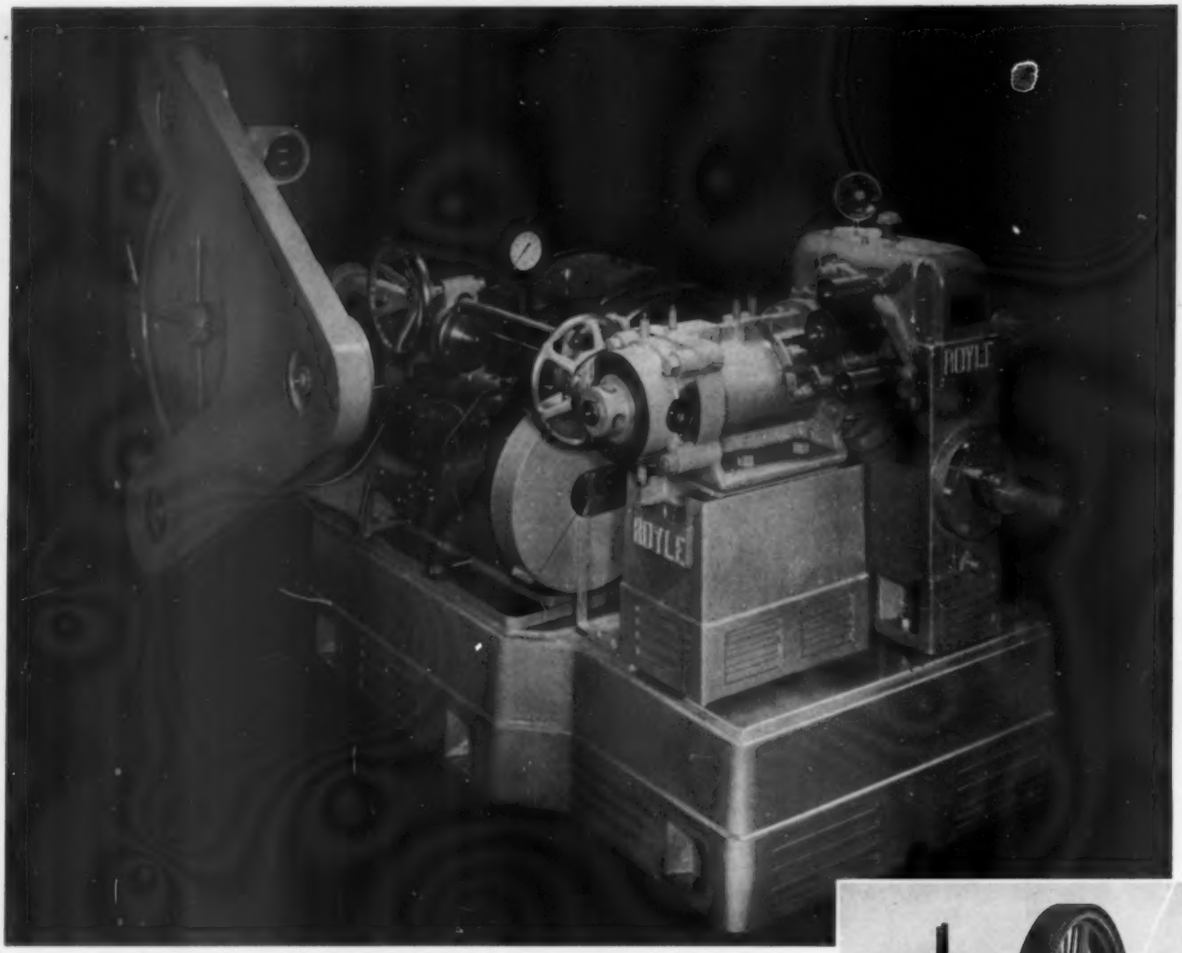

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The RUBBER AGE

VOL. 55, No. 5 AUGUST, 1944

The Carbon Spectrum for the Rubber Compounder

By C. W. SWEITZER and W. C. GOODRICH

Columbian Carbon Research Laboratories, New York, N. Y.

THE introduction of GR-S has confronted the rubber compounder with a variety of new problems. Not the least of these involves the selection of colloidal carbon grades best suited for his compounds. This selection must provide not only adequate reinforcement but also satisfactory processing and other physical properties. In some instances, electrical conductivity properties must be provided as well.

Today the carbon industry has available a greater variety of carbon grades than ever before to satisfy these special demands of GR-S compounds. However, evaluation of this wide range of blacks is a tedious process when carried out by standard compounding tests. The need for a more direct approach to carbon evaluation, involving particularly simpler methods, has become urgent. It is with this purpose in mind that the present paper has been prepared.

On the basis of recent developments in the technology of colloidal carbons, rationalization of the carbon picture by the rubber compounder can be accomplished by the following considerations, *viz:*

(1) Recognition of the fundamental properties of colloidal carbons,

(2) Appreciation of the effects of these properties on the behavior of colloidal carbons in rubber compounds, and

(3) Evaluation of these fundamental properties by simple non-rubber tests.

Fundamental Carbon Properties (The Three Building Stones)

The Carbon Spectrum is defined as the gamut of available types and grades of colloidal carbon offered to industry, ranging from the coarsest thermal types to the finest channel grades. Occupying intermediate positions in the spectrum are the reinforcing channel blacks and the expanding group of furnace carbons.

Note: This article is based on a talk given by Dr. Sweitzer before the New York Rubber Group in New York City on May 26, 1944.

The behavior of any or all of these carbons in rubber can be rationalized on the basis of three fundamental carbon properties (the Three Building Stones), *viz:*

(1) pH
(2) Surface
(3) Structure

pH: The pH properties of colloidal carbons were first described in 1937 (*1*). It was revealed that carbons vary greatly in their pH effect, ranging from a value of 2.5 (the acidity of lemon juice) to about 11.0 (the alkalinity of cleansing powder). Low or acid pH was shown to be intimately tied up with the volatile matter (CxOy complexes) on the carbon surface, but no explanation was offered to describe high or alkaline pH other than the absence of volatile.

This volatile matter was also found to be responsible for the strongly selective adsorptive behavior of "acid" reinforcing carbons for alkaline substances, and in the case of Hevea compounds, for alkaline accelerators. The recognition of these and related adsorptive effects as the cause of cure disturbances in Hevea compounds led to the selection of pH, the most convenient measure of these effects, as the preferred index to rate of cure of carbon-rubber compounds. pH thus became the First Building Stone.

Surface: For years the development of good physical properties (reinforcement) in Hevea was ascribed to the fineness of the colloidal carbon used. With no means available, however, for measuring this fineness directly, conjecture flourished as to the size and shape of the carbon particles. In 1940 (*2*) the electron microscope provided the answer. For the first time the carbon particles could be seen and accurately measured. They were found to be spheroidal in shape and of much smaller size than originally estimated. The particles of reinforcing channel black, for example, were revealed to have a mean diameter of 28 millimicrons. This correction in size values necessitated a corre-

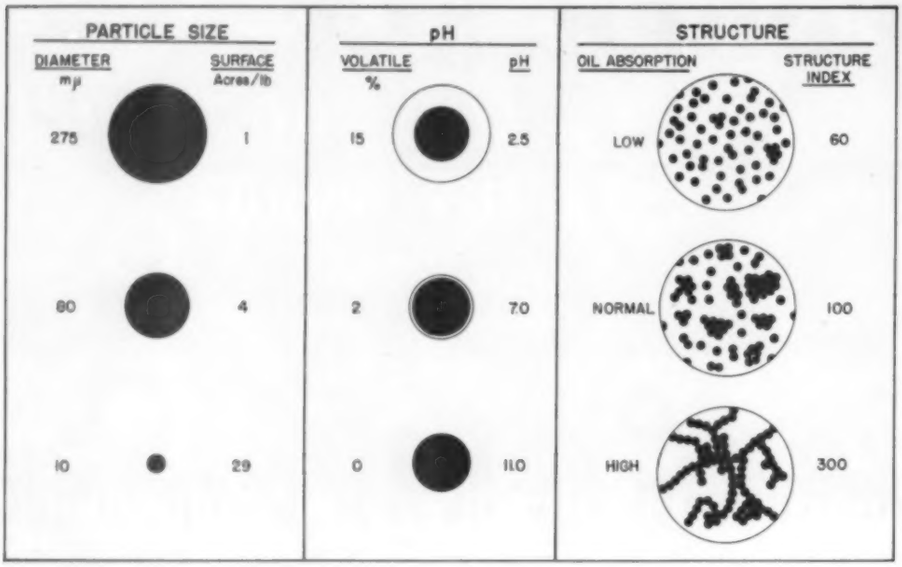

FIG. 1—The Carbon Spectrum — Surface (Particle Size), pH and Structure. Schematic, not to scale.

sponding drastic upward revision in surface area values.

Based on these new surface values for colloidal carbons, ranging from 1 to 32 acres per pound across the spectrum, it was possible to evaluate more accurately the effect of carbon surface on the physical properties of Hevea rubber. It was shown in 1942 (*3*) that carbon surface plays the dominant role in the development of these properties, with, however, certain anomalous effects evident that demanded clarification. Surface then became the Second Building Stone.

Structure: Examination of the "anomalous" carbons then followed. These carbons were anomalous in the sense that in many properties they gave values either higher or lower than expected on the basis of their surface. Again the electron microscope provided the answer. It was revealed in 1942 (*3*) that this anomalous behavior was intimately associated with recognizable differences between carbons in their agglomeration and dispersion habit. The "low" anomalous carbons displayed a low degree of agglomeration in the dry state with a high degree of dispersability in the mixed condition. The "normal" carbons revealed a higher, albeit varying, degree of agglomeration in the dry state with a corresponding varying resistance to dispersion. The "high" anomalous carbons, on the other hand, showed a striking agglomeration habit in the dry state that took the form of a branched network rather than a clustered structure.

Dispersion tests revealed that this network type of agglomeration was most resistant to dispersion, with the networks in some cases persisting after milling. Here was a new property of carbons involving agglomeration habit with a corresponding wide variation in dispersion behavior. This property of carbons was simply referred to as "Structure" and all carbons were described as possessing varying degrees of structure. Structure became the Third Building Stone.

TABLE I—CARBON SPECTRUM—pH, SURFACE AND STRUCTURE

Name	*Symbol*	*Columbian Grade*	*pH*	*Surface Area (Acres/lb.)*	*Structure Index**
Highest Color	———	Royal Spectra Mark I	2.8	32	100
Medium Color	———	Superba	3.5	16	100
Hard Processing Channel	HPC	Micronex Mark II	4	12	100
Medium Processing Channel	MPC	Standard Micronex	4.5	11	100
Easy Processing Channel	EPC	Micronex W-6	5	10	100
Conductive Channel	CC	Conductex A	4.2	14	120
		Conductex B	9	11	200
Acetylene	——	———	8	7	300
Conductive Furnace	CF	Statex A	10	8	100
Fine Furnace	FF	Statex B	10	8	100
High Modulus Furnace	HMF	Statex 93	10	6	160
Semi-Reinforcing Furnace	SRF	Furnex	9	4	100
Fine Thermal	FT	———	8	3	60
Lampblack	LB	RMV	4	2	200
Medium Thermal	MT	———	7	1	60

* Calculated as percentage of normal oil absorption.

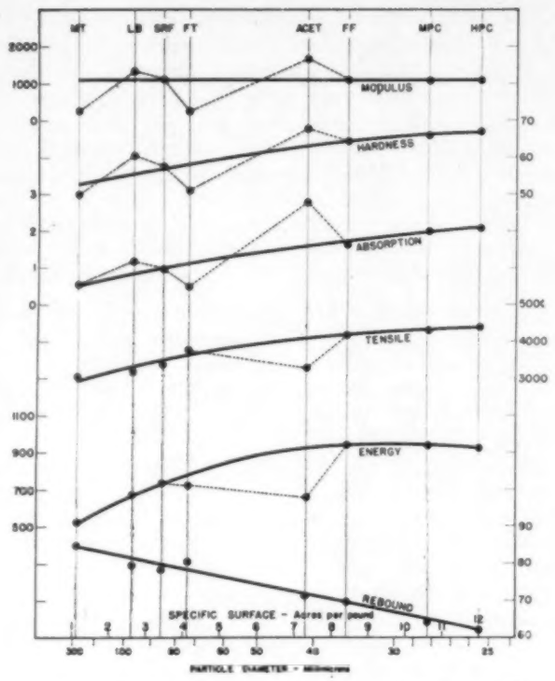

FIG. 2—Effect of Carbon Surface and Structure on Hevea Properties (50 parts carbon).

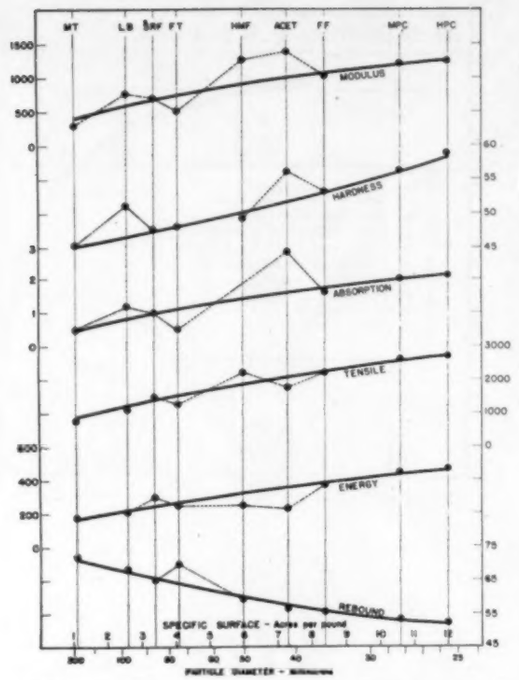

FIG. 3—Effect of Carbon Surface and Structure on GR-S Properties (50 parts carbon).

These Three Building Stones are shown schematically in Fig. 1. The wide range in properties is evident. Consideration of all possible combinations of these properties leads to a staggering total of potential carbon types. The industry has, of necessity, standardized on a limited number of grades, with those of most immediate interest to the rubber compounder presented in Table I. It is noted that these standard grades cover the spectrum rather thoroughly in the matter of surface, particularly in the range of 1 to 12 acres. Gaps still remain in the range of pH and structure properties.

Electrical Conductivity: The electrical conductivity properties of carbons, because of their increasing importance in many rubber compounds, are also of primary interest to the rubber compounder. It will be demonstrated later that the conductivity behavior of carbons is subject to analysis on the basis of these three fundamental carbon properties.

The Three Building Stones in Rubber

Effect of pH on Rate of Cure: The effect of pH on the cure of Hevea rubber was first recognized in 1937 (*1*). It was shown that low pH carbons retard cure, an effect ascribed to adsorption reactions between the organic accelerators and the "acid" carbons. On the other hand, high pH carbons were found to accelerate cure and the "alkaline" carbons therefore permitted economy in organic acceleration.

This same effect of pH on rate of cure has also been noted in GR-S. In GR-S, however, high (total) carbon surface in some cases rates about equally with high pH as a cure promoter (*4*).

Effect of Surface and Structure in Hevea: These effects were first analyzed and described in 1942 (*3*), with surface revealed as the dominating influence, subject, however, to the important and sometimes controlling role of structure. The relative importance of these two influences is demonstrated by regraphing the original data as in Fig. 2, in which the solid lines show the effect of surface and the broken lines the effect of structure.

It is observed that rebound is completely dominated by surface, showing a decline with increasing fineness of carbon. Energy and tensile also reveal the dominating influence of surface with two additional effects evident, however. The effect of high structure shows up in the depressed values of energy and tensile for acetylene black—the effect of some lack of dispersion for the finer carbons in the flattening of the energy curve beyond the 8-acre region.

In absorption and hardness the effect of structure becomes relatively more important, while in modulus structure appears to dominate. These properties are the most sensitive to structure differences in the carbons, with the high structure carbons giving values higher than normal and the low structure carbons values lower than normal.

Effect of Surface and Structure on GR-S: The effects of carbon surface and structure on the physical properties of GR-S are broadly similar to those shown for Hevea, with, however, some important differences. By regraphing the data (Fig. 3) given in a recent paper (*5*), along the lines of Fig. 2, the effects in GR-S can be more conveniently compared with those in Hevea.

Rebound is dominated by surface as in Hevea and to about the same degree. Tensile and energy are more completely dominated by surface than in Hevea, with

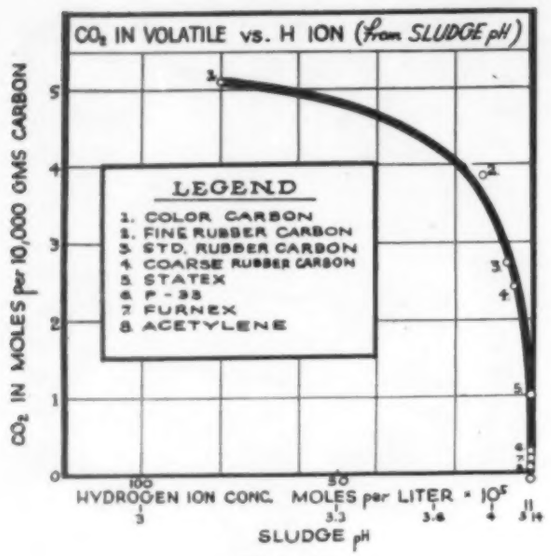

FIG. 4.

the greater slope due to lower gum strength. In these properties the anomalies of structure are not quite as evident as in Hevea, and the flattening tendency in the region of the fine carbons, observed in Hevea, is replaced by an uninterrupted rise in the case of GR-S.

In the case of hardness the general trend is similar to that of Hevea. In the case of modulus, however, surface reveals a decided influence, with the L-300 values showing marked increases for the finer carbons. In summary, carbon surface is more dominant in GR-S than in Hevea, with the effect of carbon structure correspondingly less dominant although definitely evident.

Evaluation of the Building Stones

Evaluation of pH

Test Method: pH, as already stated, is a measure of the chemical activity of the carbon surface and is an index to rate of cure of Hevea as well as GR-S. Its measurement is readily carried out by the following method, which varies only in detail from the methods previously described *(1, 6)*:

"Select a beaker of convenient size for the particular pH electrode being used. Put in carbon black to ½ capacity. Add distilled water to ⅔ capacity and stir until carbon is wetted. For oily blacks 1 cc. of alcohol is added. Boil for 15 minutes, keeping beaker covered with watch glass.

"Cool in open or in pan of cold water for ½ hour. Pour off supernatant liquid and determine pH of remaining sludge, stirring just before immersion of electrode. Take several readings 3 to 4 minutes apart and record the final constant reading. It is essential that all apparatus be clean and free of impurities which could affect pH."

Cause of Acid pH: Recently it has been found *(3)* that acid pH values, expressed as hydrogen ion concentrations, correlate excellently with the CO_2 content in the volatile matter removed from the carbon (Fig. 4). This CO_2 content in turn is largely developed from carboxyl groups on the carbon surface. Evidence for the presence of these groups is given by oxidation studies which revealed the end-product of carbon oxidation as mellitic acid *(7)*, and by the similarity of pH versus CO_2 and pH versus phthalic acid relationships *(8)*.

It is these carboxyl groups that largely explain the selective adsorptive action of acid carbons for alkaline solutes, as for example alkaline accelerators or kickers, with a consequent retardation in cure. There are other factors that contribute to acid pH effects in carbons but they are relatively unimportant. Chief among these are the soluble sulfur acids which exist in traces on most carbon black surfaces and whose extraction results in a slight decrease in the acidity of the carbon. It is largely the presence of these soluble sulfur acids which causes the greater acidity of lampblacks (Fig. 5).

Cause of Alkaline pH: The factors that cause carbons to give alkaline pH values are not as yet so clearly explained, although there is evidence that the following factors are contributory, *viz:* (1) low volatile or increased purity of surface, and (2) increased hydrogen in volatile.

The effect of low volatile or increased purity of carbon surface in raising pH is evident from the trend of the right hand curve in Fig. 5. It is observed that extrapolation of this curve leads to the region of the low volatile, high pH, furnace carbons.

The effect of hydrogen on pH was determined by re-oxidizing or reactivating a series of deoxidized impingement carbons (from which hydrogen as well had been removed) and comparing the CO_2-pH correlation curve with that for the original impingement carbons. It is noted in Fig. 5 that the reactivated carbons show more acidity (lower pH) for the same CO_2 content, indicating that the difference is due to hydrogen. The exact form of these hydrogen groups on the carbon surface has not been determined.

Evaluation of Particle Size and Surface

The Electron Microscope: The electron microscope provided the first accurate means for the measurement of particle size *(2)*. The procedure generally followed is to take one or a series of photographically enlarged electron photomicrographs of the carbon under investi-

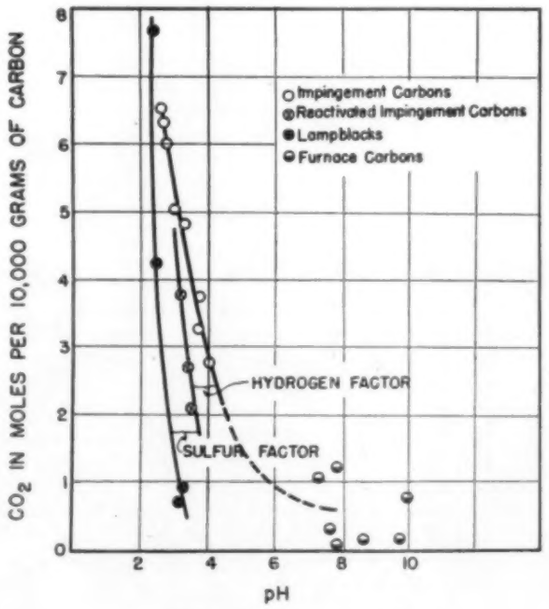

FIG. 5—Factors in pH.

TABLE II—THE CARBON SPECTRUM COLOR CHART

*Carbon**	*Color (Eye Shades)*
Royal Spectra Mark I	260
Supertex	232
Neo Spectra Mark II	220
Lakoblak	209
Superba	190
No. 999	174
Excelsior	166
Raven 11	157
Raven 15	151
G-264†	135
Statex B	119
G-42†	103
Statex 93	95
F-M2†	76
Furnex	58
Lampblack RMV	45
Thermax (MT)	0

* These carbons represent only the original standards used. Values for all other carbons are obtained by reference to these standards. † These are experimental carbons.

gation, measure the diameters of the discrete or exposed (at least to a full diameter) particles, cast these readings into a distribution curve and determine the mean and modal values. The accuracy today with improved sampling, magnification and measuring techniques, is probably within ±5%.

A sufficient series of such measurements has been made to date to provide particle size values for a range of carbons across the spectrum (Fig. 6). With these values it was possible to investigate thoroughly the utility of simpler, indirect methods for evaluating particle size.

The Mineral Oil Color Test: After investigating many indices of particle size it was found that a simple rub-out color test in mineral oil provided the best correlation to size and surface of colloidal carbons. This test offered several additional advantages over other tests. It was fast, requiring approximately 15 minutes for a result. It was simple. And it was extremely sensitive to fineness. The standardized mineral oil color test used in these laboratories is described in detail as follows:

Two-tenths of a gram of carbon and 1.5 cc. of Squibb's white mineral oil are mixed for 150 revolutions on the Hoover Muller, using one weight (50 lbs.) and picking up after each 50 revolutions. Portions of the standard and the experimental mixes are drawn down side by side on a glass slide and the color difference judged on the wet side under a carbon arc or other strong light.

The unit of color difference is the shade, which is the smallest difference the eye can detect. Multiples of this are estimated up to four, beyond which intermediate mixtures of the paste are made in order to reduce the individual differences to four shades or less. The color rating of the sample is then assessed in terms of the known value for the standard used. From this color value the corresponding particle size and surface area values are read off from the mineral oil color-particle size correlation chart (see Fig. 7). As far as possible a standard carbon is selected close to the sample, to avoid undue additional manipulation of the pastes after milling, which has a tendency to lower the color.

The Carbon Spectrum Color Chart: Before a color-particle size correlation chart could be prepared, it was first necessary to evaluate the complete Carbon Spectrum in terms of color (shade) values. Zero color value was assigned to the grayest colloidal carbon available (Thermax), and color values were determined

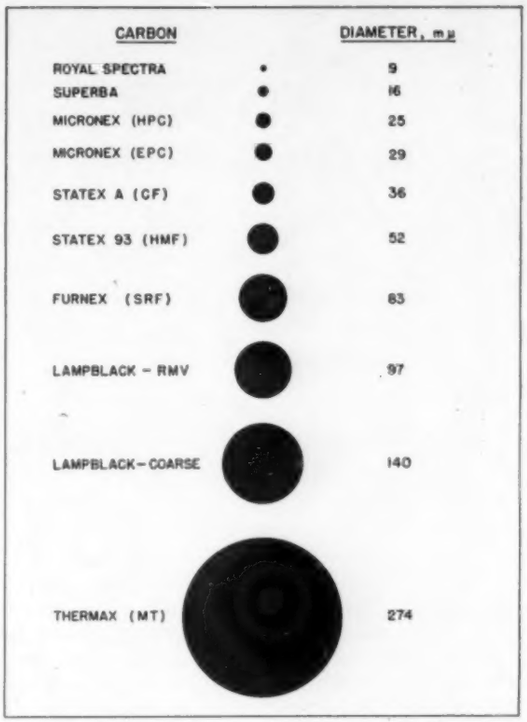

FIG. 6—The Colloidal Carbon Spectrum—Particle Size. Schematic, to scale. (100,000 X).

for a series of seventeen carbons, set up as standards covering the spectrum to the blackest carbon (Royal Spectra Mark I). The total range of color values for the spectrum was found to be 260 shades. This color chart for the spectrum is shown in Table II. By use of the standards in this chart it was now possible to determine readily the color value of any intermediate carbons.

The Color-Particle Size Correlation Graph: Using known particle size and surface area values for some of the standards in the color chart, as previously determined by the electron microscope, the correlation

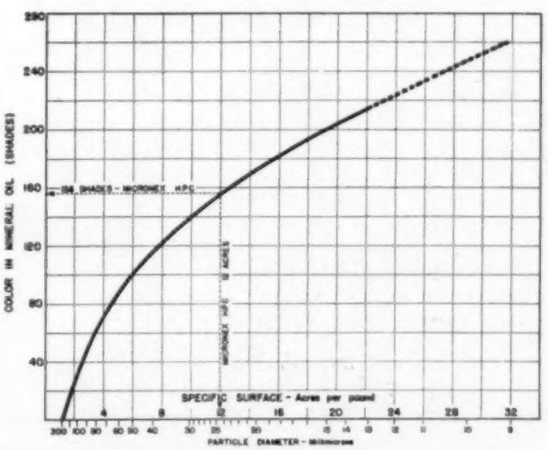

FIG. 7—The Colloidal Carbon Spectrum—Color vs. Specific Surface.

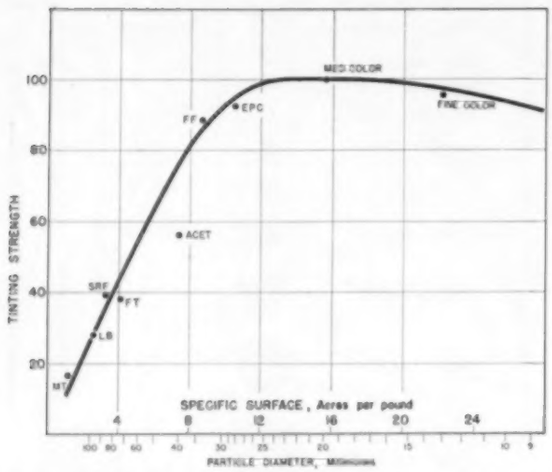

FIG. 8—Tinting Strength vs. Surface Area of Colloidal Carbons.

chart shown in Fig. 7 was developed. It is noted that color is most sensitive to particle size at the coarse end of the spectrum and least sensitive at the fine end. In the region of the reinforcing furnace and channel blacks, one color shade is equal to approximately 0.3 millimicrons in particle diameter or .1 acre in surface area values, well within the experimental error of the electron microscope.

The value of this correlation chart is obvious. By a simple color test on a carbon like Micronex Mark II (HPC), for example, giving a color value of 156 shades (Fig. 7), it is possible to read off directly a surface area value of approximately 12 acres for this carbon. It is for this purpose, of determining quickly and fairly accurately the surface area value for an unknown carbon, that the color test and the correlation chart are most useful.

Evaluation of Surface Availability

Dispersion Problems with Fine Carbons: Dispersion difficulties are encountered in rubber as well as other vehicles when the carbon size goes beyond a certain fineness due to the increasing difficulty in breaking down the more tenacious aggregates of the finer particles. This critical dispersion point falls in the region of the 10-acre carbons, as indicated by the plateau or flattening values for energy occurring approximately in this range (see Fig. 2). In other words, it becomes increasingly more difficult to develop the total available surface with the finer carbons. That dispersion is sensitive in this critical region is confirmed, for example, by the well-known greater difficulty in dispersing blacks in rubber finer than HPC (a 12-acre carbon). The importance of evaluating this property of surface availability becomes obvious in view of its effect on the development of maximum tensile and energy properties.

The Tinting Strength Test: A satisfactory method for evaluating the surface availability of carbons is by a Tinting Strength Test, carried out as follows:

The mineral oil color mixes previously described and a 50% zinc oxide paste in lithographic varnish are used for this test. Four grams of the white ink and 0.153 grams of the black paste (1:100 reduction) are mulled for 100 revolutions on the Hoover Muller with three weights totalling 150 lbs. Comparisons are made on a slide or panel. Additional weighed amounts of the white paste are added to the stronger mixture until the shades of gray are equal. The strength of the weaker carbon is then stated in terms of the stronger, after correcting both to the moisture-free basis. It is advantageous to adopt the strongest carbon as a standard, rating others on the basis of this standard.

Tinting Strength-Surface Availability Correlation: Following this method and using the strongest carbon as standard (100%), tinting strength values were determined across the spectrum for a series of carbons. The results plotted against particle size and surface gave the correlation shown in Fig. 8. It is noted that tinting strength rises rapidly in the zone of the coarser carbons, with a decided plateau developing in the region of 10-acre carbons. This plateau reaches its maximum at about 12-acres and thereafter gradually falls off to lower values. The broad similarity of this curve to the energy curve in Fig. 2 is striking.

It is obvious from Fig. 8 that carbons finer than 12-acre Micronex Mark II (HPC) are apt to develop dispersion difficulties in rubber with the resultant minor energy and tensile advantages hardly worth the effort.

Evaluation of Structure

Three Structure Types: Three types of carbon structure are recognized although naturally there are carbons with intermediate structure characteristics. Since structure is defined in terms of the degree and the destructibility of carbon aggregates, the three types are defined in terms of these properties. They are as follows:

(1) Low or Sub-normal Structure, typified by the thermal carbons, is characterized by a loose, clustery aggregation habit with a corresponding ease of dispersion. This sub-normal structure is apparently due to a low order of carbon-carbon attraction. Carbons of this type are easy to disperse (Fig. 9) but develop lower modulus, hardness, absorption and bound rubber properties than would be expected for a normal carbon of the same particle size.

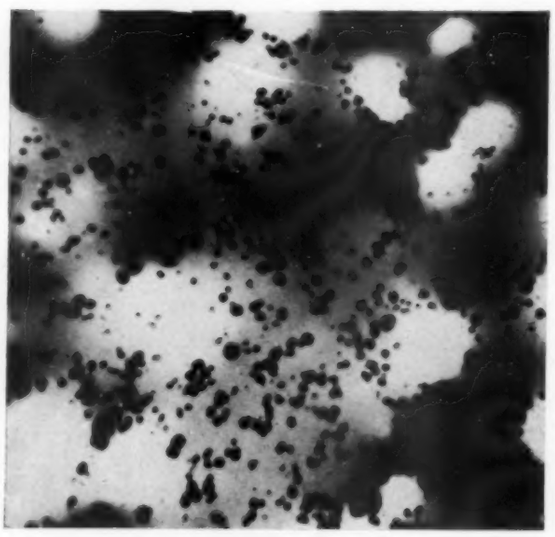

FIG. 9—Electron Photomicrograph of P-33 Carbon in Rubber Cement. (15,000 X).

(2) Normal Structure, typified by the standard semi-reinforcing and full-reinforcing carbons, is characterized by a more pronounced clustery aggregation habit (see Fig. 1). These aggregates can be broken down by suitable dispersion means and satisfactory dispersion attained, the degree of dispersion governed largely by the particle size of the carbon and the work done. This normal structure indicates a high order of carbon to carbon attraction. Carbons of normal structure produce maximum reinforcement in rubber tor their particle size, varying somewhat in degree, however, with the completeness of the dispersion.

(3) High or Super-normal Structure, strikingly typified by acetylene and to a lesser extent by the high modulus furnace (HMF) carbons, is characterized by a rigid aggregation habit. This aggregation takes the form of a branched system of carbon networks or chains (see Fig. 1) instead of the clustery groups evident in the normal type of structure. In this network system the carbon-carbon bonds are much stronger than those of the normal carbons. These carbons display the same carbon-rubber bond strength of the normal carbons, with the decreased tensile and energy values shown in Figs. 2 and 3 due to the persistence of the carbon networks or chains with a resultant shortening of the rubber. On the other hand, this rigid brush-heap or network structure is responsible for increased modulus and absorption properties of this group of carbons. Acetylene black is typical of the super-normal structure type of carbon.

Stiff Paste Oil Absorption Test: A satisfactory test developed for evaluating structure properties in carbons is the Stiff Paste Oil Absorption Test, which is carried out as follows:

Alkali-refined linseed oil is added a few drops at a time to one gram of carbon on a mixing stone. After each addition the oil is incorporated thoroughly with a spatula, using moderate pressure. Tiny pellets are formed gradually, increasing in size as more oil is added. The end-point, approached one drop of oil at a time, is reached when a single ball of stiff paste is formed. Lampblacks will give a somewhat softer end-point than channel carbons. Results may be reported as c.c. of oil per gram of carbon or as gallons per 100 lbs.

The advantage of this test lies in its dispersion method, which is just severe enough to classify structure.

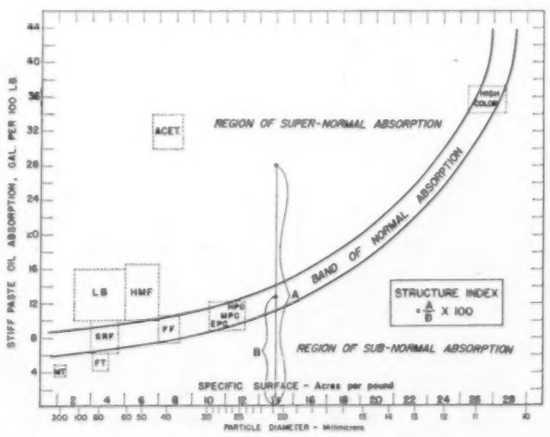

FIG. 10—Oil Absorption and Structure Index of Carbons.

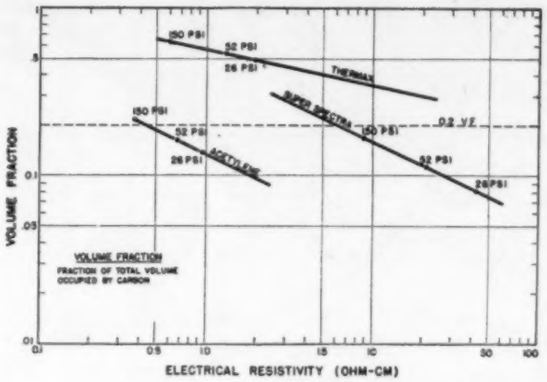

FIG. 11—Electrical Resistivity of Colloidal Carbons.

Structure Index: Absorption values plotted against particle size give the graphical relationship shown in Fig. 10. The normal carbons lie in the band, while the sub-normal carbons fall below the band and the super-normal carbons lie above the band. In order to determine structural differences quantitatively, absorption values are expressed as a percentage of the corresponding normal value taken as 100. This quantitative measure is called "Structure Index," with values below 100 indicating sub-normal structure, and values above 100 indicating super-normal structure.

In Fig. 10 the classified families of carbons are placed in their correct structure position, and the method of determining structure index is indicated. This method of evaluating and expressing structure in terms of structure index is now used in the Columbian Laboratories to rate all carbons, particularly those carbons with index values above 100, such as the lampblack. acetylene, and HMF carbons.

It is interesting to note from Fig. 10 that fine carbons as well as coarser carbons with super-normal structure can give high absorption values. Therefore, in evaluating the structure of an unknown carbon, its proper position or correct structure index can be determined only in conjunction with a fineness value obtained from the color test. However, since most of the carbons used by the rubber compounder lie in the region where the normal band is flattest, the correction for fineness is in most instances negligible and not required in the practical determination of structure index. The high modulus furnace carbons (HMF), which are the newest family of furnace carbons, lie just within the super-normal structure class and find use in GR-S for easy processing and high modulus properties.

Electrical Conductivity of Carbons

Colloidal carbons differ in their electrical conductance properties in the dry state as well as in rubber compounds, this variation depending on the properties of the carbon. The dry state conductance behavior is dependent on the fundamental carbon properties of surface, pH and structure. In rubber compounds additional factors include the degree of dispersion and the type of compound used. The current investigations were carried out to evaluate the effect of the Three Building Stones and to determine in turn the correlation of dry resistivity to Log R (Log of D.C. Resistivity) in rubber.

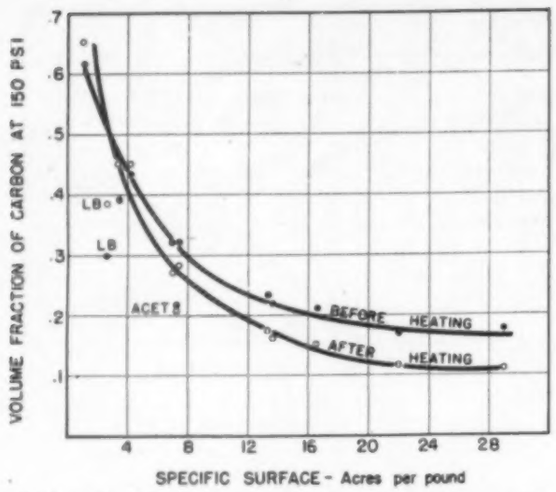

FIG. 12—Variation in Volume Fraction with Surface Before and After Deactive Heating.

Dry Resistivity Test: The preferred test for measuring the electrical resistivity of carbons in the original state involves the use of a simple test cell and an ohmmeter, as follows:

The apparatus consists of a pair of cylindrical brass electrodes which fit closely into a thick-walled glass tube (approximately 6" x ¼" I.D.). The upper electrode is fitted with a brass plate upon which weights may be placed. The electrodes are connected through an ohmmeter. A quantity of carbon (1 to 5 grams, depending upon the apparent density) is placed between the ends of the electrodes inside the glass tube and compressed successively with a series of weights calculated to give pressures from about 25 to 150 pounds per square inch. Resistance and volume measurements are made at each step. Specific resistance and carbon volume fraction (fraction of carbon in the total test volume) are calculated for each pressure. These values, when plotted on logarithmic co-ordinates, lie on a straight line, from which resistivity at any selected carbon volume fraction may be read.

Results for three typical carbons are plotted in Fig. 11. A coarse carbon *(ex.* Thermax), with a subnormal structure, shows high compression as indicated by its high volume fraction values. The volume fraction of this carbon at 150 psi is 0.61 which is fairly close to the calculated density of uniform spherical particles under random packing (60-70%). Super Spectra carbon, a fine, normal structure carbon, gives appreciably lower volume fraction values, indicating a much greater resistance to compression. Acetylene black, a super-normal structure carbon, intermediate in particle size, also gives lower volume fraction values. It is interesting to note that the slopes of the Super Spectra and acetylene curves are identical, indicating similar compression-resistance behavior, in one case due to extreme fineness, and in the other case, to extreme structure.

The electrical resistivity values for these three carbons are also informative. The lowest values are given by acetylene, which is a low volatile, medium fine, high structure type. Thermax, although of low volatile, is a coarse type of carbon and gives higher resistivity values. Super Spectra shows much higher resistivity values due unquestionably to its much greater volatile content, hence, greater contact resistance.

Equal Volume Fraction: The importance of comparing resistivity values at equal volume fraction is evident when it is realized that carbons are commonly compared in rubber compounds at equal volume loading (in other words, equal volume fraction). A convenient volume fraction figure used for comparing carbons in these laboratories is 0.20, which corresponds to the volume fraction value of 0.194 for a 50% carbon loading in rubber. The graphical method employed in Fig. 11 permits a rapid interpolation of resistivity values at the 0.20 volume fraction figure, a procedure justified in view of the straight line relationships shown.

TABLE III—EFFECT OF SURFACE AND DEACTIVATION OF CARBONS ON VOLUME FRACTION AND ELECTRICAL RESISTIVITY

Carbon	Surface Area (Acres/lb.)	Original Volatile *	Resistivity and Volume Fraction (150 psi) — Original — Res.†	VF	— Deactivated — Res.†	VF
Medium Thermal ..	1.1	0.8%	150.0	.613	5.0	.653
Lampblack 18	2.6	3.0	5.6	.299	.78	.385
Furnex	3.4	0.2	4.3	.392	.82	.450
K-3	4.2	0.2	5.7	.434	1.1	.450
Acetylene	7.3	0.3	.44	.216	.43	.209
Statex B	7.0	0.3	4.3	.320	.54	.270
Statex A	7.4	0.6	1.6	.320	.57	.282
Raven 11	13.3	6.0	50.0	.231	.25	.176
#242	13.6	7.5	15.0	.218	.27	.161
Superba	16.6	8.5	6.4	.209	.20	.152
Super Spectra	22.0	7.0	6.0	.168	.22	.115
Royal Spectra Mark I	29.0	19.0	33.0	.176	.26	.109

* Volatile after deactivation was in every instance below 0.2% for the low volatile carbons and below 0.5% for the high volatile carbons.
† Resistivity expressed as ohms per cm. cube.

Volume Fraction versus Surface: A series of tests were run to determine the effect of surface on volume fraction, using original carbons as well as the corresponding deactivated blacks. The results for a series of carbons covering the spectrum are included in Table III and presented graphically in Fig. 12.

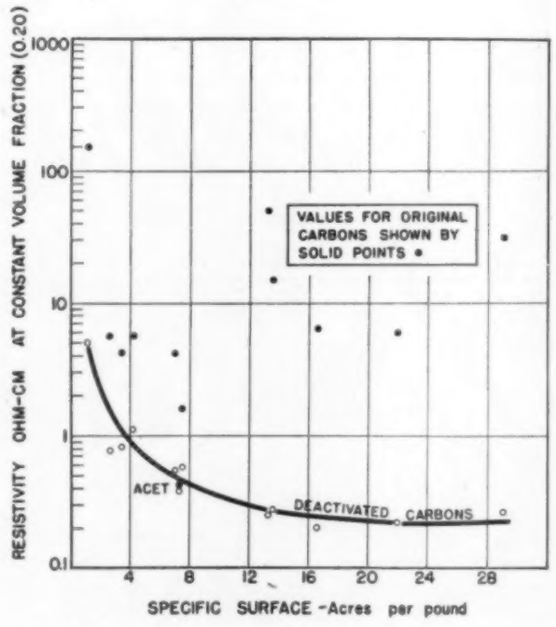

FIG. 13—Effect of Deactive Heating on Electrical Resistivity of Colloidal Carbons.

It is noted from the results in Fig. 12 that the volume fraction decreases with increasing surface or fineness, rapidly in the case of the coarse carbons and slowly for the fine carbons. This effect is due to the increasing resistance to compression of the finer carbons. The super-normal structure carbons show lower values than indicated by their surface, due to the greater resistance of structure carbons to compression.

Deactive heating results in lower volume fraction values for all the carbons except those of 4-acre surface or coarser. This effect of deactive heating on the finer carbons is undoubtedly due to the development of some super-normal structure with decrease in particle size, resulting in greater resistance to compression. With the coarser carbons, including the high structure lampblack, deactive heating increases volume fraction. This result may be due to improved packing resulting from the removal of oily components. Acetylene black shows very slight volume fraction change on deactive heat treatment.

Elimination of bridging effects, by taking more precautions in compressing the black sample in the test cell, would not alter the general trend of these results.

Effect of Volatile and Surface on Resistivity: The series of control and deactivated carbons, described in Table III, was used in electrical resistivity tests. The values obtained were plotted at constant volume fraction against surface to give the results shown in Fig. 13. The values for the original carbons are shown by the solid points while the values for the corresponding deactivated carbons are indicated by circle points.

It is observed that the effect of volatile removal is to decrease greatly the electrical resistivity, in some cases by as much as a hundredfold. By bringing all the carbons to approximately the same condition of volatile, the results fall close to a smooth curve. The rapid decrease in resistivity for the coarse carbons, with a decided leveling off for carbons of 12 acres or finer, would indicate no advantage in using carbons much finer than 12 acres surface for minimum resistivity or maximum conductivity.

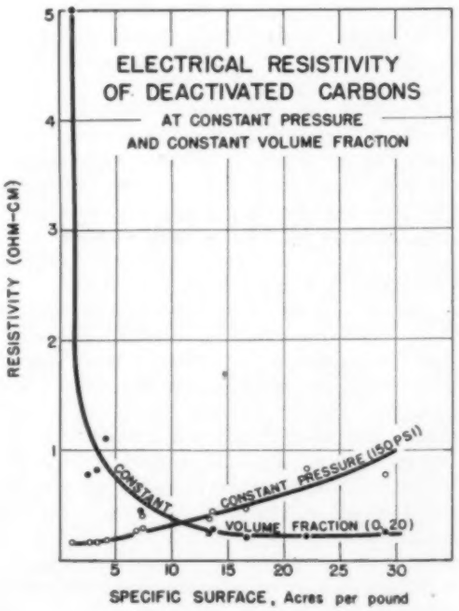

FIG. 14.

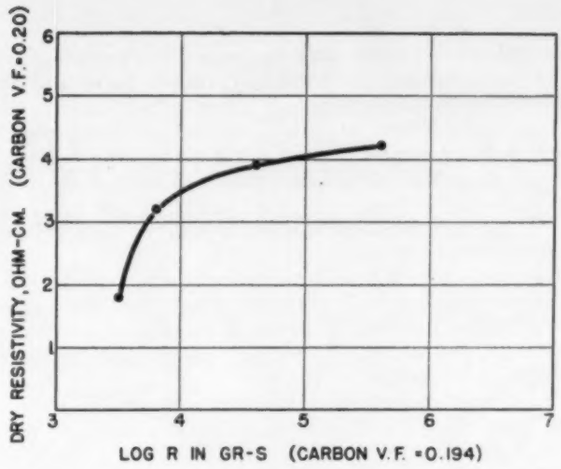

FIG. 15—Electrical Resistivity vs. Log R in GR-S for Statex Carbons.

If the values for resistivity of the deactivated carbons are plotted on the basis of constant pressure, as in Fig. 14, an increase in resistivity with increased surface is shown. This would be expected in view of the results given in Table III, indicating decreased volume fraction for the finer carbons at equal pressure.

Effect of Structure on Resistivity: The effect of structure on resistivity is more difficult to evaluate quantitatively due to the lack of a convenient series of structure carbons of constant volatile and surface. However, inspection of Fig. 13 leads to several conclusions of interest. High structure, as present in lampblack and acetylene carbons, results in electrical resistivity values somewhat lower than would be expected on the basis of their surface. When these carbons possess an appreciable volatile, as in the case of lampblack, the removal of this volatile by deactive heating permits the high structure properties of the black to give resistivity values lower than expected. On the other hand, when a high structure carbon possesses very little volatile, deactive heating reduces the resistivity only slightly.

In summing up it is evident that decreasing volatile and increasing surface and structure result in decreased resistivity of colloidal carbons, with volatile reduction being the most, and high structure the least, contributory. Since all three basic carbon properties influence resistivity, it is obvious that in any comparison of resistivity readings for dry carbons and the corresponding carbon-rubber mixes, correlation would only be possible if at least two of the basic carbon properties remained constant.

Dry Resistivity vs. Log R: A series of Statex carbons of varying particle size, but constant volatile and structure, proved to be satisfactory blacks to check this correlation. Plotting Log R values, obtained from GR-S compounds containing 50 parts Statex, against dry resistivity values for the same carbons, gave the graph shown in Fig. 15. It is noted that the correlation is excellent, with the curvature in the graph ascribed to the effect of surface area on Log R.

In conclusion, dry resistivity provides a good index to Log R in rubber *provided* only one of the three Building Stone properties is varied.

Summary

It has been shown that through the evaluation of three basic carbon properties by simple tests, and by recognition of the effects of these properties in the behavior of carbons in rubber, the rubber compounder has the means for predicting fairly closely the behavior of any carbon of the spectrum in Hevea and GR-S rubber.

pH, as measured on a carbon slurry, provides an index to rate of cure.

Surface, as evaluated by simple mineral oil color and tinting strength tests in correlation with fineness values for a limited number of standard carbons, provides an index to reinforcement, tensile, energy and rebound properties in rubber.

Structure, conveniently measured by an oil absorption test in conjunction with known surface area values, provides the index to the anomalies in modulus, hardness, extrusion and related properties in rubber.

Electrical conductivity, shown to be a derived rather than a basic property, correlates with electrical conductivity in rubber provided two of the three basic carbon properties remain constant.

ACKNOWLEDGMENT

Grateful acknowledgment is made to W. B. Wiegand, Director of Research, for helpful suggestions and for permission to publish this paper.

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General Silentbloc Couplings and Mountings

THE Mechanical Goods Division of the General Tire & Rubber Co., Wabash, Ind., has recently introduced a new line of couplings and mountings, to be known as Silentbloc.

General Silentbloc is a union of concentric metal cylinders joined by a layer of rubber under pressure. It is made up of three main members—a straight or flanged tube, a rubber cushion ring, and an inner sleeve or solid shaft. Rubber is inserted in the tube under high pressure; then the sleeve is shot through the rubber ring with terrific force. The extreme pull of the elongated rubber produces an indestructible cohesion of parts. Each Silentbloc design is engineered to give the needed deflection in all planes.

General Silentbloc depends upon a mechanical adhesion rather than a chemical bond to obtain its efficient operation. This adhesion results from pressure produced by the elongation of the rubber, which in turn results from the distortion caused by opening the inside and closing the outside diameters of the rubber insert. By varying the ratio of the opening of the inner to the closing of the outer insert, greater pressure can be produced on the outer or inner element, as required. The variables, therefore, are the shape of the closure, amount of elongation, the modulus of the compound, the thickness of the rubber wall, and the ratio of distortion.

General Tire engineers state that Silentbloc uses less rubber than other mountings. They also claim that it absorbs vibration and prevents it from being transmitted from one unit to another and that it is an indestructible bearing suitable for an oscilating movement of limited amplitude. Once installed, it is trouble-free. It is liquidproof, gasproof, dirtproof, and makes a permanent seal. It needs no care, no upkeep, no lubrication, and no attention. Another outstanding feature of General Silentbloc is that it moves without sound or squeaks.

Silentbloc also corrects misalignment. It finds its own center on the object and compensates for the close tolerances which would otherwise be required. Any type of metal can be used in General Silentbloc units, although steel and aluminum are ordinarily used. It can also use natural, synthetic, or reclaimed rubber, depending upon individual requirements.

Available in a variety of holders to fit most any mounting problem, General Silentbloc isolates the center-point from the outer holders with a cushion of rubber designed to absorb shock and vibration. The shapes are square, diamond, round, square cup, and round cup.

Delicate instruments, radios, sound equipment and similar units are easily mounted on the pedestal, or cup-like units, with little trouble. Heavier units are supported by the other types. Changes in the shape of mounts, or in the rubber compounds used, affect changes in their capacities and loads.

Confined between overlapping flanges at the top and bottom of the well type of mounting, Silentbloc rubber completely insulates the inner sleeve from the outer member, and the engine or machine bolted to the inner sleeve is "floating" on rubber. Deflection of the mounting under load is not controlled by the tightness of the fixing bolt. By changing the shape and size of the confining shoulders, it is possible to obtain any desired curve of deflection. Further variations may also be obtained by altering the shape and hardness of the rubber itself. These well type mounts can be mounted at any angle in order to obtain maximum flexibility.

For isolating heavy machinery from building foundations, General Tire recommends the pedestal type mounting. Where machinery is already bolted to the floor, the addition of a platform type Silentbloc is suggested, this type being supplied in all sizes and capacities.

Ideally suited to carrying radial loads on moving or vibrating equipment, the tube type of Silentbloc serves other purposes as well as those of vibration elimination. For example, when mounted on an automobile spring shackle they perform a torque action as well as vibration absorption. Capable of supporting loads varying from a pound or two up to many thousands of pounds, these tube type mountings perform well on static loads and outstandingly with active, moving loads.

Vinyl Elastic Plastics

A Brief Description of Their Properties and Characteristics Together with Comments on Present and Potential Applications

Among the well-established plastic materials now releasing rubber for those uses to which it is urgently needed are the plasticized vinyl chloride-acetate copolymer resins, generally referred to as elastic plastics. Compounded similarly to rubber, these elastic plastics are not substitutes for that material, since they possess unique properties of their own, some of them superior to the rubber. The following descriptive material, furnished by the Carbide and Carbon Chemicals Corporation, should help the rubber manufacturer secure an impression as to what these elastic plastics are, and enable him to compare their properties with those of crude and synthetic rubber.—Editor.

IN their natural form, vinyl chloride-acetate resins, from which elastic plastics are produced, are white, fluffy powders. They are supplied in this form to those industries which have processing equipment, such as the rubber industry, for compounding into coating materials and other products. A number of compounded, or semi-fabricated, forms are also produced. Sheeting and film are supplied in a wide range of transparent and opaque colors, in rolls of various widths and thicknesses. These can be cut and punched with standard tools, and bonded by sewing, cementing or heat-sealing. Other compounds are produced for calendering onto cloth; for extruding, like rubber, into continuous rods, tubes, edgings and coverings for electrical wires and cables; and for molding either by the compression- or injection-molding processes.

The properties of elastic vinyl plastics vary widely depending on the grade of vinyl chloride-acetate resin, the type and amount of plasticizer, and the type and amount of fillers and other ingredients. Table I illustrates the properties of three typical sheeting formulations based on a high molecular weight vinyl chloride-acetate resin and containing, respectively, 30, 35 and 40 per cent by weight plasticizer. Other compositions are used to meet special electrical, mechanical or chemical requirements.

Advantages of Vinyl Elastic Plastics

Elastic vinyl chloride-acetate plastics are noted for their unusual resistance to oxygen and ozone. Oxygen bomb tests, such as conducted on resin-coated cloth for Army raincoats, prove them to be immune to oxidation at ordinary temperatures. Neither long periods of aging nor prolonged exposures to sunlight will cause any appreciable change in physical or electrical characteristics. They will not deteriorate during long periods of service, even in hot, humid, tropical climates.

The toughness and abrasion resistance of elastic vinyl chloride-acetate plastics are unsurpassed by those of any other flexible material. Tensile strength is greater than that of rubber compounds of equivalent characteristics. In recent abrasion-resistance tests, special formulations demonstrated more than twice the life of standard high-grade rubber compounds. This extraordinary resistance to abrasion is still further demonstrated in a test on 19-oz. duck, used for floats and other inflatable equipment, which was calender-coated with a plasticized vinyl resin. In this test, where the inflated equipment was tested for resistance to abrasion and wear, the plastic coating provided 3 times the protection of rubber coatings of the same thickness.

Unlike rubber and many other flexible materials, certain types of elastic vinyl chloride-acetate plastics will not support combustion or propagate flame. This is an important factor when considering insulation coatings for electrical wires and cables. Many disastrous conflagrations are caused by fire spreading along rubber-covered wires. Since this cannot happen where wires and cables are protected with vinyl plastic insulation, special fire-resistant wrappings or treatment are avoided.

Elastic vinyl plastics are far superior to rubber in resistance to water, oils and grease. Even after 24 hours' immersion in water at 25°C., water absorption is less than 0.20 per cent. When plasticizers are properly chosen, the resulting material is resistant not only to moisture and lubricants but also to many acid and alkaline chemicals, and neither mold nor mildew will affect it.

In fatigue resistance, these flexible vinyl plastics compare favorably with rubber. One type of sheeting, for example, will withstand 3,000,000 cycles in a mechanical flexing tester without cracking or creasing,

TABLE I—PROPERTIES OF TYPICAL VINYLITE ELASTIC PLASTICS

	Type 30	Type 35	Type 40
Tensile strength, lb. per sq. in.	2500	2000	1300
Ultimate elongation, percent	300	330	350
Olsen stiffness index, x 10^{-4} in. lb. (.040 in spec.)	145	96	56
Low temperature flexibility, *TF*.°C.	-17	-30	-39
Tear resistance, lb. per in.	30	25	20
Hardness, durometer "A'	86	75	67
Fatigue resistance, cycles to failure	500,000	>1,000,000	>1,000,000
Abrasion loss, vol. in proportion to "B" rubber as 100	80	70	62
Flammability, burning rate, sq. in./sec., .040 in. thick	Nonflammable		
.020 in. thick	0.2	0.3	0.4
Specific gravity	1.23	1.20	1.18
Specific heat between 18 and 38°C. (Cal.) $(Gm.)^{-1}(°C.)^{-1}$	0.33	0.35	0.36

and can be stretched to more than three times its original length at room temperature. Yet even when stretched to such extremes, it returns slowly to size without the "snap-back" common to rubber. This delayed recovery after deformation makes these elastic plastics more suitable than rubber for certain types of vibration damping. Although elastic vinyl plastics tend to stiffen at low temperatures, certain types retain their flexibility even at —50°F.

The electrical insulation properties of vinyl plastics, dry or wet, are exceptionally good. Depending upon the type of formulation employed dielectric strength at 25°C. ranges from 900 to 1100 volts per mil on a 0.025-in. thickness. The dielectric constant, at 1,000,000 cycles per second, is 8.3 to 10.5 at 70°C.

Vinyl chloride-acetate plastics can be pigmented to meet any color requirement, many brilliant or delicate colors remaining stable after long exposure to light. A unique characteristic, impossible with rubber, is that they may be formulated into transparent as well as opaque forms.

Applications of the Vinyls

Many important wartime products which previously employed rubber are being served more efficiently and given longer life with vinyl elastic plastics. One of the most important uses is found in the calender-coating of cloth for Army and Navy needs. Army raincoats, as well as inflatable equipment and paulins of many types, are now waterproofed with vinyl plastics. Such coatings do not become brittle, but retain their flexibility at temperatures as low as —50°F. They do not become sticky in hot climates. They do not develop a disagreeable odor after continued use or storage. Cloth coated with a vinyl plastic is generally much lighter in weight than that treated with rubber. Whereas rubber-coated raincoats require 6 to 10 oz. of coating per sq. yd. of cloth, as little as 2½ to 3 oz. of vinyl compound are needed. This results in appreciable manufacturing economies.

Heavy elastic vinyl plastic coatings on cloth are employed for upholstering seats on tanks and aircraft. In such hard service they have proved much superior to rubber-base artificial leather in moisture resistance, toughness and flexing life. Wear-resistant floor mats in bomber planes also are made from thick coatings of elastic vinyl plastic, and have deeply embossed skid-proof surfaces.

Many types of vital electric wires and cables are now protected with extruded coatings of vinyl plastics instead of rubber. Being nonflammable and highly resistant to abrasion, much thinner coatings provide equal protection. Transparent tubing, flexible at flying temperatures of —50°F., is employed as conduits for aircraft wiring, thus simplifying the inspection of light and power lines. Elastic vinyl plastic tubing also serves as water- and chemical-resistant hose for inflating floats, and for draining storage batteries. Sliced in half, it is used as weather-resistant and wear-resistant windshield wiper blades for planes.

Unusual advantage of elastic vinyl chloride-acetate plastics is their adaptability to both compression molding and injection molding—a characteristic lacking in other flexible materials. In both processes, parts come from the mold ready to use. Curing and vulcanizing, necessary with rubber, are avoided. Compression-molded products for wartime service include chemical-resistant face forms for gas masks and complete tops for storage batteries. With the injection-molding process, transparent terminal insulators for aircraft wiring, grommets, bumpers and many other products are produced at high speeds, and come from the mold completely finished in a single operation.

Rubber fabricators can realize important savings with elastic vinyl plastics. Curing or vulcanizing, which occupies a large part of the facilities of most rubber plants, is eliminated. The plastic compounds come from the press, extruder or calender mill as completed products. Yet the handling of these materials is essentially the same as the handling of rubber. In many processes, standard rubber processing equipment may be used with only minor alterations, and no extensive re-education of personnel is required.

The foregoing discussion does not imply that vinyl elastic plastics are the immediate and complete answer to the rubber shortage. Army and Navy demands have been increased so rapidly that today the vinyl plastics are among the more critical war materials, and are available only upon direct allocation by the War Production Board. The rapid strides made in fitting these and many other plastics to the exacting requirements of the war will, however, pay dividends in improved peacetime products when victory has been won and production for civilian use is resumed.

Letter to the Editor

TO THE EDITOR:

We note on page 387 of the July issue of RUBBER AGE a picture and paragraph regarding rubber battery separators being made by the U. S. Rubber Company. The statement is made that this rubber separator "is said to make possible for the first time shipment of these batteries to all battle fronts in a fully charged condition but without acid and water."

We want to recall to your attention that the first practical rubber battery separator in general use was developed by our company and the Willard Storage Battery Company, and was used by the Willard Storage Battery Company for a great many years under the name of Thread Rubber Separator. Production of these separators in quantity was begun very shortly after the last war and continued up to a few years ago when the all rubber separator as made by United States Rubber was produced at lower costs because it contained no cotton. The Willard Storage Battery Company made a strong point in their advertising of the fact that the batteries were shipped in a dry condition.

Since the start of the present war, we have again entered into the manufacture of these thread rubber separators on a much improved basis and have been turning them out to the maximum capacity of our plant. The great advantage of the present thread rubber separator is the fact that it contains no crude rubber whatever and this has resulted in a substantial saving of natural crude rubber, which is still necessary for the manufacture of the all rubber separator. Furthermore these present separators are being produced at considerable saving in man hours over the method in use before production was stopped several years ago.

Yours very truly,

JOSEPH STOKES RUBBER CO.

July 28, 1944. W. J. B. Stokes—President.

The Effect of Temperature on the Ozone Cracking of Two Natural Rubber Compounds

By J. M. BALL, R. A. YOUMANS and A. F. RAUSELL*

R. T. Vanderbilt Co., East Norwalk, Conn.

Two compounds were used: an ozone-resistant, low tensile compound and a channel black stock similar to that used for tire treads. The test specimens consisted of loops 10″ long (20″ long in mean circumference), molded square ¼″ x ¼″. The loops were mounted on a mandrel holding pegs inserted at predetermined positions; and the loops were held stretched over these pegs at six different elongations, viz. 0, 5, 10, 15, 20 and 50 per cent. The mandrel with mounted specimens was placed in a long vertical container maintained at a definite temperature. Six different temperatures were used, viz. —50, —18, 0, 25, 37.5 and 70° C. A stream of ozonized air entered at the bottom of the container and emerged at the top. The concentration of ozone at the inlet was constant for all temperatures. After the mounted specimens were conditioned to temperature they were exposed to the ozonized air for a period of 30 minutes, at the end of which they were removed from the container and inspected for kind and degree of cracking. For both compounds maximum cracking occurred at 25° C.

THE wire and cable industry has developed what has now become an accepted and required laboratory test for high voltage cables, whereby cables or rubber samples in a bent or stretched position are exposed to ozonized air and are observed for their resistance to attack by ozone. The temperature of test has been empirically established as 25° C., but inasmuch as many cables such as ignition cables are used in service at wide extremes of temperature, it was thought worthwhile to try to determine in the laboratory the effect of temperature on the ozone cracking of vulcanized compounds of natural rubber. The work described in this article was done in the Vanderbilt Laboratory early in 1941.

Two compounds were used: an ozone-resistant, low tensile compound and a channel black stock similar to that used for tire treads. The compositions are as follows:

	Compound A (Ozone-Resistant)	Compound B (Tire Tread-Type)
Smoked sheet	100	100
Reogen	1	...
Stearic Acid	1	4
Pine Tar	...	2
Agerite	1.5	1
Zinc Oxide	5	3
Channel Black	...	47
Dixie Clay	25	..
Kalite No. 1	100	..
Tysonite	200	..
Litharge	20	..
Sulfur	3	3
Captax	1.5	1
	458.0	161.0

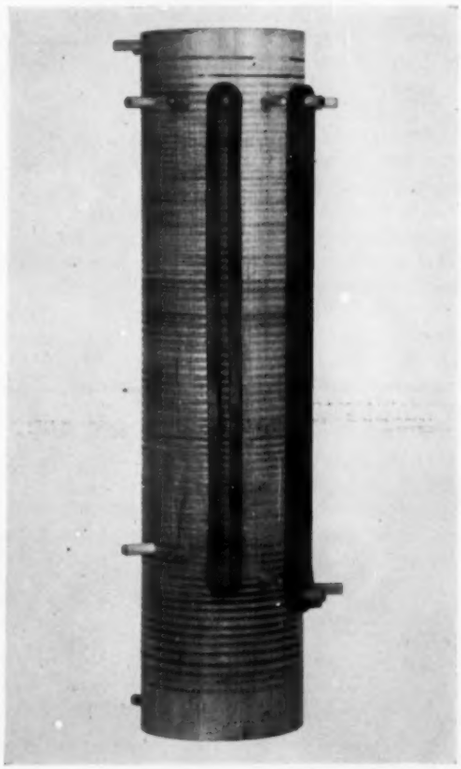
* Now with Master Tire & Rubber Corp., Findlay, Ohio.

The physical properties of these two compounds at optimum tensile cures as determined at room temperature on press-cured slabs are:

Press Cure @ 287 °F.	20 Mins.	30 Mins.
Stress @ 200% (lbs./sq. in.)	435	790
Stress @ 300% (lbs./sq. in.)	570	1430
Tensile Strength (lbs./sq. in.)	975	3920
Elongation (%)	520	605
Shore Hardness	61	61

Test Specimens

The test specimens consisted of loops 10″ long (20″ long in mean circumference), molded square ¼″ x ¼″. They were cured at 287° F., 30 minutes for Compound A and 40 minutes for Compound B, these times being 10 minutes longer than for the test slabs. The loops



Wooden mandrel with mounted specimens

Table I—Kind and Degree of Ozone Cracking

(Ozone Concentration 0.013%. Exposure 30 Minutes.)

The figure for degree of cracking is a rating from 0 to 10 based on the number and depth of cracks. A rating of 0 means that no cracking occurred, and a rating of 10 would indicate profuse cracking, deep enough that the sample would be cracked almost completely through.

	Compound A — (Ozone-resistant)						Compound B—(Tire Tread Type)					
% Elong. during exposure	0	5	10	15	20	50	0	5	10	15	20	50
Exposed at 70° C. (158° F.)												
Degree of cracking..	0	0	0	0	0	8	0	0	2	1	1	1
Size of cracks.....						Medium			Fine	Very Fine	Very Fine	Very Fine
Exposed at 37.5° C. (100° F.)												
Degree	0	0	0	0	1	9	0	5	9	9	5	1
Size					Large	Medium		Large	Medium and Large	Small	Small	Very Fine
Exposed at 25° C. (77° F.)												
Degree	0	0	0	2	4	9	0	5	9	9	8	4
Size				Large	Large	Medium		Large	Medium and Small	Small	Small	Fine
Exposed at 0° C. (32° F.)												
Degree	0	0	0	0	0	0	0	1	3	7	8	7
Size								Medium	Small and Medium	Medium	Medium	Fine and Small
Exposed at —18° C. (0° F.)												
Degree	0	0	0	0	0	0	0	0	0	0	0	0
Exposed at —50° C. (—58° F.)												
Degree	0	0	0	0	0	0	0	0	0	0	0	0

were mounted on a solid wooden mandrel holding wooden pegs inserted at predetermined positions; and the loops were held stretched over these pegs at six different elongations, viz. 0, 5, 10, 15, 20 and 50 per cent. See the accompanying photograph.

The modulus at room temperature of duplicate loops was determined for each elongation. The loops were also held at each elongation for 60 minutes and the modulus values were again read; this being done for the reason that during temperature conditioning and ozone exposure the loops were held in a stretched condition for this length of time. The modulus values of the loops at the 5 remaining temperatures were determined for 50 per cent elongation only. These determinations at the different temperatures were made by means of a spring balance; the samples being in a double walled container made from two stove pipes, one placed inside the other, with the temperature control liquid between.

Procedure

Two long vertical containers for holding the wooden mandrels were prepared, each container being made by soldering together bottom to top two 1-gallon cylindrical tin cans. One container served as a control, holding a mandrel without any rubber specimens; and the other served as the operating chamber, holding the mandrel with the mounted specimens. The containers were placed side by side in a large iron drum holding liquid (which came nearly to the top of the containers) maintained at the desired temperature. Six different temperatures were used, viz. —50, —18, 0, 25, 37.5 and 70° C. (—58, 0, 32, 77, 100 and 158° F. respectively). The liquid used for the highest temperatures was water, heating being accomplished by means of electrical immersion units. For 0° C. ice water was used. For the two lowest temperatures acetone containing dry ice was used. Constant stirring was em-

Table II—Ozone Concentrations

Temp. During Exposure	Control Container Inlet Column 1	Control Container Outlet Column 2	Oper. Container Inlet Column 3	Oper. Container Outlet Column 4	Diff. Column 5
70° C.	0.0136%	0.0092%	0.0136%	0.0015%	0.0077%
37.5° C.	0.0122	0.0099	0.0122	0.0036	0.0063
25° C.	0.0130	0.0095	0.0130	0.0027	0.0068
0° C.	0.0127	0.0095	0.0127	0.0047	0.0048
—18° C.	0.0130	0.0096	0.0130	0.0071	0.0025
—50° C.	.....	.....	.....	0.0084	.....

Columns 1, 2 and 3. These readings were constant before and after test runs.

Column 4. Average of determinations made at the end of 10 and 25 minutes.

Column 5. Difference between column 2 and column 4.

Table III—Modulus Values of Loops (lbs. per sq. in.)

Loops First Held Stretched for 60 Miuutes at the Elongation and Temperature Shown

	Compound A (Ozone Resistant)					Compound B (Tire Tread Type)				
% Elong. During Exposure	5	10	15	20	50	5	10	15	20	50
Temp. During Exposure										
70° C.	..	..	..	..	36	..	..	..	..	136
37.5° C.	..	..	..	..	68	..	..	..	..	164
25° C.	16	24	38	44	76	34	64	80	100	172
0° C.	..	..	..	..	144	..	..	..	..	184
—18° C.	..	..	..	..	128	..	..	..	..	152
—50° C.	..	..	..	..	Rigid	..	..	..	..	160

ployed throughout. One thermometer was suspended in the liquid, and a second thermometer was inserted through the lid of each container.

The ozone was generated and circulated by the standard A.S.T.M. method and was allowed to enter at the bottom of either container through a thin walled copper tubing immersed in the liquid. The outlets were at the tops of the containers. The concentration of ozone was determined both at the inlets and at the outlets by periodic titrations, and the generator voltage for each temperature of exposure was regulated so that these respective concentrations for the control container were the same (within experimental error) for each temperature. These concentrations for the control container were approximately 0.013 per cent by volume for the inlet and 0.010 per cent for the outlet, the difference being due to the container and dummy mandrel.

When equilibrium with respect to temperature and ozone concentrations was reached in the control container the mandrel containing the mounted specimens was placed in the second container, the lid was closed and the samples were conditioned to temperature for 30 minutes. Then the ozone stream was diverted by a stop cock to this second container and the exposure was conducted for 30 minutes. Titrations were made at the end of 10 minutes and 25 minutes. At the end of the 30 minute exposure period the mandrel with specimens was removed and the kind and degree of cracking was noted. Results are noted in Tables I, II and III.

Summary of Results

1. The critical elongation *(i.e.,* the elongation at which maximum cracking occurs) for Compound A is about 50 per cent, and for Compound B is about 10 to 15 per cent. The room temperature modulus of the loops at these respective critical elongations is about the same for the two compounds, and this fact suggests that "critical stress" may be as significant as critical elongation.

2. The cracking on both compounds is most severe at 25° C., and nearly as severe at 37.5° C. At —18° C. and below there is no cracking on either compound.

3. The decrease in ozone concentration from inlet to outlet in the operating container is greater than the corresponding decrease in the control container, because of the presence of the test specimens; and this difference, shown as Column 5 of Table II, increases with increasing temperature.

No attempt is made to explain the results obtained, but it is hoped that this paper may stimulate discussion and further work by others.

ACKNOWLEDGMENT

The authors thank A. A. Somerville and E. B. Curtis for permission to publish this paper, and they also thank A. V. Roberts of the General Electric Co., Bridgeport, Conn., for having carefully reviewed the manuscript.

Thermodynamic Properties of Cis-2-Butene

CIS-2-BUTENE ($H_3C.CH:CH.CH_3$) is one of the hydrocarbon compounds that occur in some of the chemical reactions involved in the manufacture of butadiene for synthetic rubber. A knowledge of the thermodynamic properties of these compounds is useful in controlling these chemical reactions and in testing the purity of the final products. *Cis*-2-butene is a gas at ordinary temperature. It boils at +3.7° C. and freezes at —138.9°C.

In an investigation by Messrs. Scott, Ferguson and Brickwedde, of the National Bureau of Standards of the U. S. Department of Commerce, discussed in the July, 1944, issue of the *Journal of Research*, published by the Bureau, the specific heat of solid *cis*-2-butene was measured from 15 degrees absolute up to its melting point. The specific heat of the liquid was measured from the melting point to room temperature. Vapor pressure and heats of vaporization were measured between —78° C. and +13° C. Using these data, tables of thermodynamic properties derived from the low temperature calorimetric data were extended to 1,200° C. by calculations using spectroscopic data and the methods of statistical mechanics.

The extent of the conversion of *cis*-2-butene to *trans*-2-butene, a closely related compound, also involved with *cis*-2-butene in the making of synthetic rubber, was calculated.

Specific Heat and Entropy of GR-S

BECAUSE GR-S is the type of synthetic rubber being produced in much the largest quantity, this material was included in the program of determining basic thermodynamic properties of natural and synthetic rubber and of the components from which they are made initiated more than ten years ago by the National Bureau of Standards of the U. S. Department of Commerce. This program has already included work on natural rubber, isoprene, and Hycar OR-15. Data obtained from these studies are needed in calculations having to do with: (1) chemical reactions in the manufacture of the monomers, (2) the reactions of polymerization, and (3) vulcanization and other reactions involving the polymerized material.

In the latest report on this program, contained in the July, 1944, issue of the *Journal of Research*, published by the Bureau, Messrs. Rands, Ferguson and Prather describe measurements of specific heat on GR-S from —258° C. (15° K) to about 60° C. The specific heat at 25° C. was found to be 1.894 international joules. $gram^{-1}$. $degree^{-1}$. A second-order transition, one which involves a marked change in the specific heat over a short temperature range, was discovered at about —61° C. Similar transitions have been found in Hycar OR-15 at about —23° C., and in natural rubber at —70° C. It seems evident that the specific heat values just below the transition, and the transition temperature itself, depend on the thermal treatment of the sample.

Testing of Rubber Compounds at Underwriters' Laboratories, Inc.

By B. P. CALDWELL, Jr.
Assistant Secretary,
Underwriters' Laboratories, Inc.,
Chicago, Illinois

The year 1944 marks the completion of the first fifty years of service of Underwriters' Laboratories, Inc. When the service was first organized its laboratory equipment consisted of a bench, a table, a few chairs, and $350 worth of electrical equipment. Today it operates one of the most completely equipped rubber testing laboratories in the country. The nature of some of the present equipment and the rubber testing conducted by the laboratory in conformance with the service offered to industry are detailed in the accompanying story.—Editor.

UNDERWRITERS' LABORATORIES, INC., maintains a rubber laboratory at its main testing station at 207 East Ohio Street, Chicago, principally for the investigation of compounds used as the insulation of electrical wires and cords and as the linings of fire and other hose, and for check-testing the results of UL inspectors who examine such products at the factories. The equipment for this work has been developed to obtain a high degree of accuracy in the testing of widely diversified products.

As experience has shown that it is difficult for different operators to check closely in measuring thicknesses and diameters with ordinary dial micrometers and micrometer calipers, a special dial micrometer was designed by the Laboratories' engineers which does not distort the rubber.

Each of the ovens at the laboratories are equipped with two thermostats, one for control and the other as an auxiliary safety.

Steam baths at the laboratory are housed in a room which has openings at the tops of the walls to vent pressure in case of explosion.

This micrometer has jeweled bearings and operates smoothly with a load of only 10 g. on the pressure foot. The foot and anvil are narrow and thus accurate readings may be obtained even if the wire is slightly kinked. Comparison of readings taken with this instrument against measurements made with the micrometer microscope shows that the insulation is not distorted enough to affect readings taken to 0.001 in. A similar dial micrometer has a pin instead of an anvil so that tubular insulation may be slipped on it and direct readings of the insulation thickness obtained.

A bank of eight Precision Freas mechanical convection rubber aging ovens is used to expose the samples to circulating air at elevated temperatures. Positive circulation of air is maintained by blowers outside the sample chamber. Temperature is recorded individually in each oven by means of thermocouples connected to a Leeds and Northrup Micromax recorder which records at one minute intervals.

Each oven is equipped with two thermostats connected in series, one for control, the other as an auxiliary. The control thermostat is set to the desired operating temperature which it maintains within 1°C. A white pilot lamp located on the front of the oven indicates when the heaters are on or off. The auxiliary thermostat is furnished as a precaution to guard against accidental temperature changes and is usually set at one or two degrees higher than the control thermostat. The auxiliary thermostat contacts are normally in the closed position and the red indicator lamp is

normally on. The installation of this auxiliary is desirable to avoid any possibility of overheating the oven on long-time tests and consequent burning or damaging of the samples.

The auxiliary thermostats were installed on the Laboratories' ovens by the Precision Scientific Company. They are standard equipment on ovens of this type which have been made in the last year or so. Full directions from the manufacturer are available to enable users of ovens not so equipped to make the installations themselves.

The equipment for exposing specimens to oxygen under pressure at elevated temperature was designed with the object of providing capacity for testing a large number of samples, and keeping the number of specimens in each pressure vessel small, so that danger of migration between dissimilar compounds will be minimized.

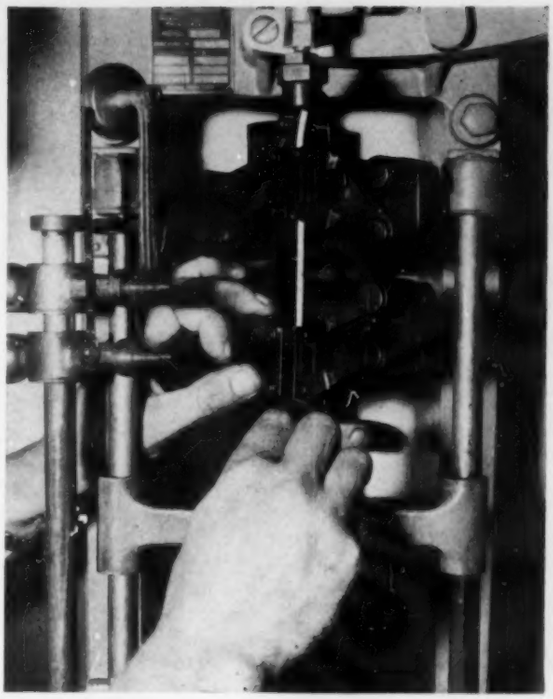
The pressure vessels are small, having a depth of 9.5 in. and an internal diameter of 3 in. The vessels are maintained at elevated temperature by immersing them in constant temperature water baths. There are eight of these baths, each holding three pressure vessels. Each bath is housed in a separate steel compartment as a safeguard against possible explosion. A chain is placed across the entrance of each compartment after the samples have been placed in the pressure vessels and the vessels have been placed in the water bath.

Oxygen is introduced into the vessels from the central control panel outside the bomb compartments. Entrance into the compartment after the chain is up and the pressure is on is forbidden for the sake of safety. This despite the fact that a relief valve is located at the oxygen control panel and frangible discs are installed in all pressure vessels.

Pressures and temperatures are recorded on continuous recorders mounted on the control panel above the valve manifold.

Exposure of specimens to air under pressure at elevated temperature is carried out in two jacketed steel cylinders heated by oil circulated through the jackets. The equipment is standard, manufactured by the Emerson Apparatus Company. The steel cylinders are stationary, oil is locally heated electrically, air is piped in at 80 pounds per square inch from compressors located elsewhere in the building. Each cylinder is 4¾ in. in diameter and 11 in. deep, accommodating 40 specimens. Temperature and pressure recording instruments are located outside the compartment which houses the equipment.

Micrometer dial gauge with special pin type anvil for measuring the wall thickness of insulating tubes for electrical conductors.



Placing a tubular sample of electrical wire insulation in the Scott Tester. UL uses the Bureau of Standard type jaws for this work.

Tests for resistance of synthetic rubber compounds to oil are carried out by immersing the specimens in a small steel vessel containing oil of the desired properties which is heated to temperature by placing the vessel in a larger bath containing oil at a thermostatically-controlled elevated temperature.

The ability of gasoline curb-pump hose to withstand repeated flexing is determined on a machine in which the hose is pulled back and forth over rotating wooden drums so placed that the hose is given a sharp S-bend. The hose is filled with gasoline during the test to allow observation of the effect of flexing on the gasoline-retaining properties, and at the end of the flexing period the hose is tested to determine whether it will still conduct electricity and thus dissipate any accumulation of static electricity.

Samples of wires having insulation specially compounded to resist moisture are subjected to tests in which the amout of water absorbed by the compound during seven days immersion in distilled water at 70°C. is determined. The specimens are dried to constant weight at 70°C. in a vacuum before and after immersion to determine whether any material is extracted by the hot water.

The specimens are immersed in water contained in 1000-ml tall-form lipless Pyrex brand beakers, and are suspended in the beakers by bending them to the form of a "U" and inserting both ends of the specimens through holes drilled in the flat cover plates. The beakers of water are maintained at the desired temperature by immersion in a constant temperature water bath, in the cover of which are ten holes, just large enough so that the beaker will slip through and remain suspended by the rim. The beakers fit the holes tightly enough so that the escape of steam is prevented.

Equipment for conducting chemical tests includes a laboratory-size mill for grinding the specimens, and a specially designed extraction apparatus in which the flasks are heated by a steam bath to avoid possibility of over-heating. A bank of muffle furnaces with provision for continuous recording of temperature is provided for use in determining ash and sulfur content of rubber compounds.

In addition to the equipment maintained expressly for physical tests of rubber compounds, other apparatus is available in the general laboratory for use when required. This includes equipment for electrical tests for insulation, large tension and compression machines, microscopes and other optical testing devices. Equipment for determining tendency of a material to heat spontaneously has been used in studying the fire hazard of natural and synthetic rubber products.

This view shows one end of the wire testing laboratory as it looked at the beginning of the war before the men left for the service.

The availability of such equipment greatly extends the scope of the test work which may be conducted on rubber products.

Industrial Hygiene in Hot Weather

THE high temperatures of the summer months bring with them a number of hygienic problems in the rubber and other industries. The comfort and health of workers, as well as efficiency in production, depend to a considerable extent on the degree to which hot weather conditions are controlled. A real contribution can be made, according to a special report issued by the Safety Research Institute, by maintaining as high a ventilation rate as feasible, with the rate of air movement within the workroom high enough to cool the occupants by rapid evaporation of their perspiration. Where air conditioning is used in product control, with necessary heat or humidity resulting in damp clothing at the end of the work day, provisions for showers and a change of clothing at the end of the shift are desirable.

In operations involving the use of organic solvents, care must be taken to prevent changes in the ventilation rate from causing the solvent vapors to escape into the workroom atmosphere in concentrations above those known to be safe. Since many organic solvents are of high volatility, those which may be used safely in cool atmospheres may form excessive concentrations of vapor in hot atmospheres, unless exhausted. Efficient local exhaust ventilation will solve this problem. In operations where the solvent is used intermittently or in small amounts, open windows may provide sufficient ventilation for safety, depending upon the nature of the solvent. However, where local exhaust ventilation is provided for safe use of solvents in tanks, employees generally should not be allowed to open windows; the currents of air thus created may disperse unsafe amounts of vapor into the workroom atmosphere, or, if the solvents used are flammable, may increase the hazards of fire and explosion. In such instances, to maintain a comfortable as well as safe workroom atmosphere, general exhaust should be provided, in addition to local exhaust.

Unqualified employees should not be allowed to tamper with ventilating devices provided for safety, or shut them off, as occasionally happens because some individuals prefer the natural ventilation of open windows. These same rules on ventilation generally apply also where potentially harmful metal fumes, gases, mists or dusts are controlled.

Industrial dermatitis or skin affections from contact with irritating substances used in industry are more prevalent in the summer months. This problem can be met by minimizing contact with the irritating substance, either by hoods or other mechanical means; by requiring increased personal cleanliness (which implies the supplying of enough washstands or showers, and sufficient hot water and soap); by use of protective clothing impervious to the irritating substances; and by use of protective hand creams.

In plant cafeterias, added care should be observed in the handling and refrigeration of food, and strict attention should be paid to sterilization of dishes and utensils. Drinking water should be between 40° F. and 80° F., preferably around 50° F. Salt and dextrose tablets are placed beside drinking fountains in a number of industries to prevent heat exhaustion, especially where physical exertion and consequent heavy perspiration tend to decrease the normal salt supply of the body.

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TENSILE

Tensile tests on a Statex-93—GR-S tread compound at room temperature show results such as would be expected with carbon of six-acre surface. Values are approximately 80% of those developed by the same loading of Micronex in GR-S.

Tested at higher temperatures similar to those developed in road service, tensile figures for Statex-93 treads are substantially the same as for Micronex treads. Tests at 220° F show full equivalence between Statex-93 and EPC type channel carbon.

When specimens are subjected to flexing prior to testing another striking characteristic of Statex-93 is revealed — tensile does not fall off as rapidly as in the case of compounds containing channel carbons.

We will be pleased to furnish further information.

●

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Editorials . . . . . .

Manpower Situation

FOR some time it has been realized that the difficulties facing the rubber manufacturing industry no longer embraced shortage of raw material supplies, but rather one of manpower. This is a situation which has been brewing for several months and one which was inevitable. Almost a year ago we predicted in these columns that the day was coming when the production facilities of the industry would be unable to handle the vast amount of all types of rubber which would be available once the synthetic rubber program neared completion. We wondered, too, where the manpower was coming from to handle the increased production facilities which were planned for the industry.

That the day has arrived was forcefully brought home a few weeks ago when the War Department revealed that a shortage of heavy-duty tires was threatening the advance of the invasion forces, to say nothing of essential transportation on the home front. The War Production Board, after a series of conferences with military officials, urged tire manufacturers to step up production of these vitally needed heavy-duty tires within the next two or three months. The lag in production of such tires is generally attributed to manpower shortages.

In a sense, however, as ably pointed out by the *New York Times*, the term "manpower" is a misnomer in this case, because what is actually necessary to provide more heavy-duty tires is an increase in production power or, in other words, more production per man per hour. There is good reason to believe that increases from 10 to 20 per cent can be secured in most factories on tire production if the so-called self-imposed limitations set by individuals or groups of workers are lifted. This is a finding of the War Manpower Commission after conducting an eight-week investigation in four of Akron's larger tire plants.

There is no reason to believe that these work limitations are set by any other than the individuals or small groups of workers referred to above. Officials of the United Rubber Workers of America, the rubber union, have consistently shown a desire to aid the war effort in every manner possible, even under criticism from some of the rank and file. Some method must be found to assure these individual workers that increased hourly production now, called for by a drastic war emergency, will not be held as a yardstick against them when the emergency is over. Management has learned to cooperate with labor in most respects. It is now up to individual workers to prove to management that the war effort comes first and labor-management difficulties later. Such an effort will produce the tires needed on the war and home fronts.

Well Done, Col. Dewey

BECAUSE the Office of the Rubber Director was originally established by Presidential Directive primarily to supply the country with sufficient quantities of synthetic rubber, and thus avoid a rubber crisis, and because that job has been accomplished, Col. Bradley Dewey has submitted his resignation as Rubber Director of the United States and has recommended the liquidation of the Office of the Rubber Director as of September 1. The reasons set forth for both of these decisions are discussed in full elsewhere in this issue.

Although Col. Dewey leaves three pressing problems behind him—manpower, tire cord supplies, and disposal of the government-owned synthetic rubber plants—no man can argue that he has not done his job and done it well. Called to Washington to assist William M. "Bill" Jeffers as soon as the latter was named Rubber Director following issuance of the Baruch Rubber Report, Col. Dewey has been virtually the power behind the throne. The technical decisions were his, the conversion problem was his headache, the trials and tribulations of construction were his lot—and he saw them all through. Jeffers "bulled" the rubber program along, Dewey "built" it. He has done his job and done it well. No man could do more.

CURRENT NEWS OF THE MONTH

DEWEY RESIGNS AS RUBBER DIRECTOR LEAVING MANPOWER PROBLEM TO WMC

WITH the announcement that the supply of synthetic rubber is now ample to provide for any present foreseen emergencies and the statement that the responsibility for supplying new workers, which has become the No. 1 headache of the rubber manufacturing industry, lies with the War Manpower Commission, Colonel Bradley Dewey on July 25th submitted his resignation as Rubber Director of the United States, effective September 1st. In his letter of resignation, addressed to James F. Byrnes, Director of the Office of War Mobilization, Colonel Dewey recommended the liquidation of the Office of the Rubber Director since "the need no longer exists for a highly integrated, hard-hitting organization cutting across properly established lines of responsibility of many agencies." He added that the need for ORD has been met and stressed the point that the biggest need now is for manpower. (The special report of the Rubber Director recommending the termination of his special powers is reproduced in full elsewhere in this issue.)

The drastic situation which faces the rubber manufacturing industry, particularly in the manufacture of heavy duty tires for military purpose, has been the subject of numerous meetings between government agencies and representatives of the industry in recent weeks. All of these meetings had as their aim some method of supplying additional manpower in the rubber factories. Characteristic of the rubber industry is the fact that charges and countercharges on present tire shortages have flown thick and fast in recent weeks.

Bottlenecks Are Discussed

Officials of tire companies met with Charles E. Wilson, executive vice-president of WPB, in Washington during the end of July and methods of breaking the bottlenecks in heavy duty tire production were discussed. As a result of this meeting, the Army reiterated its plan to furlough former tire workers who are now in this country.

The furlough program, outlined by Major General L. D. Clay, Director of Material for the Army Service Forces, provides that tire manufacturers may request men formerly in their employ who were 30 years old and stationed in this country, who were not in the infantry, and who had had one or more years experience as heavy tire workers and Banbury operators before entering the service.

Subsequently, the Navy reported that it is placing on inactive duty and returning to the rubber industry "a number of rubber workers skilled in the building of tires." On August 9th, the Navy announced that 34 men already had been released to report for work in 15 plants of nine tire manufacturing companies.

In disclosing that WPB had asked the tire industry to do the "miraculous" in meeting a 30% requested increase in the production of heavy duty tires in the next two months, Mr. Wilson stated that manufacturers of truck and bus tires will be granted priorities for obtaining manpower higher than those in the aircraft industry and second only to ratings given to a few industries engaged in secret military programs.

(EDITOR'S NOTE: At the same time it was disclosed that a Rubber Goods Bureau would be set up under WPB's Office of Operations headed by J. F. Clark, who has been acting as an assistant deputy rubber director. This new bureau will supplant the Office of the Rubber Director, which will be liquidated as an autonomous government agency on September 1, 1944, as recommended by the retiring Rubber Director.)

Explains Need For Tires

In explaining the seriousness of the heavy truck tire shortage to the tire manufacturers assembled in Washington, General Clay stated, "We are now shipping as much equipment to overseas battle fronts every two months as we did in the whole of the last war and it has to move on rubber from the ports of arrival. As our army advances, our supply lines are lengthened and the demand for trucking facilities increases."

Another reason for the increased demand for truck tires at the battle fronts, he said, was the fact that rail transportation is practically non-existent in battle areas because bridges and tracks are either destroyed by our own armies prior to their advance or by the Germans as they retreat.

It has also been pointed out that an increase in the demand for large size airplane tires has resulted in a diversion of materials and manpower from the production of truck tires. Where the large size tires are concerned, particularly size 12.00 and over, it is stated that approximately 98% production of such tires is now allocated to the armed forces.

Although tire manufacturers in general welcomed the cooperation of the Army and the Navy in offering to release tire workers, they were generally in agreement that the flow of such workers will never reach torrential proportions. It is estimated that approximately 1,000 men are needed in the Akron area if tire production is to be increased 30% in that area within the next two months and that there are less than 600 former tire workers from the area now in service.

Tire manufacturers have not the slightest idea how many of this number are still in the country, how many are in divisions other than the infantry, or how many would be willing to leave the army to return to their former civilian jobs. The same applies to Navy men. One company official estimated that if 125 to 150 service men return to their tire jobs he would be agreeably surprised.

Number of Workers Needed

According to a report issued by War Mobilization Director Byrnes, the following numbers of workers are needed by various tire companies in Ohio: Firestone, 521; Goodyear, 285; Goodrich, 80; General Tire, 75; Mohawk Rubber, 35; Seiberling, 83; Dayton Rubber, 33; Denman Rubber, 35; Mansfield Rubber, 72, and Master Tire, 40. These needs total 1,081 tire workers. In other words, according to one source, about 10% of tire machinery in Akron plants is idle because of labor shortages.

According to a report made by Leonard Firestone, president of the Firestone Tire & Rubber Corporation of California, to a labor-management meeting, the four major rubber companies in Los Angeles—Firestone, Goodyear, Goodrich and U. S. Rubber—are operating with 40% of their machinery idle because of the manpower shortage. Mr. Firestone estimated this shortage at 3,654 workers.

Tire manufacturers were frankly skeptical regarding the suggested use of

German prisoners of war in tire plants. Although the War Department is understood to have given a "go ahead" signal to this idea providing union officials approve, the latter are opposed to the suggestion. Union officials have expressed the belief that enough labor can be obtained for tire production jobs if certain working conditions are improved and wages for certain heavy, dirty types of work are increased.

In one move designed to increase tire production in the Akron area, the tire production expediting staff maintained in Akron by the Army Service Forces is being increased. Lt. Col. Kenneth Johnson, well known to rubber manufacturers in the Akron area, is returning to Akron to head the staff. Expediting staffs will also be organized in other tire producing sections including the Los Angeles, Detroit and Memphis areas. Another move along similar lines was the announcement that Paul Fuller, Akron representative of the Conciliation Service of the U. S. Department of Labor, has been named Commissioner of Conciliation for the entire rubber industry.

In an attempt to alleviate absenteeism, which is also a serious handicap faced by tire factories in meeting the increased tire requirements of the Army and Navy, a special committee has been organized to deal with this phase of the problem. The committee is headed by Thomas Young (U. S. Rubber) and includes E. C. Harrington (DuPont), representing rayon producers making high tenacity yarns, and G. P. Barnwell, representing tire cord manufacturers.

Special Fund Established

A special fund has been established, to which all companies included in the tire program, have contributed. This fund will be used to produce movie shorts dramatizing the importance of tires to the prosecution of the war and these films will be shown to worker groups at cord and tire plants to prove that absenteeism in such manufacturing units have direct adverse effect upon the over-all war program.

As this issue goes to press, a series of meetings is being held at Akron to find methods of putting into effect two measures to increase individual productivity and step up the output of the critically needed truck and bus tires. These proposals are: (1) a 90-day moratorium on all rates of production and other customary union practices which allegedly restrict daily output with assurance to the workers that they will get the benefit of increased pay from the higher production without being threatened with a cut in wage rates later, and (2) transfer of men from the production of less critical small tires or other work to the production of heavy truck and bus tires under an arrangement by which they will retain their seniority rights.

On August 9th the War Manpower Commission charged that workers restrictions on output are responsible for a substantial part in the lag in production of heavy truck and bus tires. This charge was based on an eight-week manpower utilization survey conducted in four of Akron's tire factories.

Harry C. Markle, WMC Director in the Akron area, charged that over-all tire production could be increased 10% with the present labor forces if the detriments to production found in the survey would be removed. He said that such an increase had already been achieved at the General Tire plant through the cooperation of management, labor and the government. The survey is reported to have indicated "evils" on the part of both management and labor but the report based on the survey was not made public on the ground that it was a "confidential document."

It was learned from other sources, however, that in some of the largest plants the survey indicated that over-all production was being restricted by as much as 15% by "the workers self-imposed limitations" in many key departments. The term "worker" was used because it is believed that labor leaders in the rubber field are not responsible for these limitations which are set up by "groups of workers" in various locals who are said to fear a return to the speed-up methods of pre-union days.

According to the survey made by WMC, time studies indicated that production could be increased 21.4% on bomber tires and 17.5% on earth mover tires, such as are used on bulldozers, if the self-imposed "limits" or "quotas" or "levels" or "goals" were removed. It was also determined that full utilization of women workers has been held back by union contract stipulations.

Together with the general shortage of manpower, it was found the factors just discussed have caused tire production in the average factory to drop behind schedule at a rate of 8 to 12% a month. The WMC survey was made by a crew of 25 men in the Firestone, Goodyear, Goodrich and General Tire plants.

LATEST PROGRESS REPORT REVEALS AMPLE SUPPLY OF SYNTHETICS

At the same time Rubber Director Dewey tendered his resignation and explained the reasons therefor, he also issued Progress Report No. 6 on the rubber situation. The report led off with the statement that the supply of synthetic rubbers is ample to provide for any presently foreseen requirements for essential rubber goods but there is a serious shortage of the large heavy duty truck and bus, airplane and tractor tires, reflecting the shortage of manpower in the rubber goods manufacturing plants.

Pointing out that less than 6,000 additional workers stood between the present shortage of tires and the ability to meet all essential requirements, the report stresses the fact that by Presidential Directive the responsibility for supplying new workers lies with the War Manpower Commission. Some of the other highlights of the report were as follows:

The production goal for passenger tires will be met, if adequate manpower and cotton tire cords are supplied. The goal of 22 million passenger tires is as large as the over-all war effort permits —especially in view of the demand for heavy cotton fabrics by the Armed Forces. In contrast with the manufacture of heavy duty tires, women can be used for the manufacture of passenger tires.

The present availability of synthetic rubbers should not lull the public into false security as to the necessity of taking care of its tires. Until more manpower, tire cords, carbon black, etc., are in sight than is now the case, it is but prudent for the owner of every tire to take care of it and worry as to where he will obtain his next tire.

The requirements of the rubber program for technically and scientifically trained men as well as certain skilled workers must continue to come before all but the most urgent and special manpower demands of the Armed Forces.

In short, the problems envisioned by the Baruch Committee when it wrote "If we fail to secure quickly a large new rubber supply our war effort and our domestic economy both will collapse" have been solved, but the demands of war are such that it may be many months before sufficient manufactured rubber goods, more particularly heavy duty truck and bus tires, are available to supply the needs of the civilian economy of the United States of America—a country "geared to rubber."

Discussing the basic situation, Col. Dewey stated that during the second quarter of this year 209,004 long tons of synthetic rubbers were produced, which represents production at the approximate rate of 836,000 tons per year. Of the amount produced in the second quarter of the year, 186,035 tons were Buna S. For the first half of the year, a total of 376,087 tons of synthetic rubbers were produced, of which 315,452 tons were consumed. Production for the first half of the year was within 213 tons of the estimate made in the previous report of the Rubber Director's Office.

At the beginning of 1944, according to the report, it was planned to build 7,000,000 passenger tires during the first six months of the year. Actually 7,686,000 units were produced in this period. The tire industry has been authorized to produce up to 6,590,000 units during the third quarter of the year and it is hoped that a total of 13,590,000 tires will be produced during the second half-year. The cotton tire cord situation, however, is so tight that any

shortage or dislocation of inventory positions would make it difficult to meet the second half-year schedule.

Status of Construction

Discussing the status of synthetic rubber, the report states that the primary construction of all of the more than 50 plants in the original rubber program for the manufacture of butadiene, styrene, Buna S, neoprene and Butyl, has been completed and the plants are operating. A 14,000 ton per year capacity expansion of the neoprene plant at Louisville, Ky., is under way and will be completed late in December.

It was also revealed that a privately financed butadiene plant with a capacity of 10,000 tons per year has been approved and is under construction at Bishop, Texas. This plant is being built by the Celanese Corporation of America using the aldol process and will employ petroleum gas as the basic raw material. Pilot plant work indicates that this process will produce low cost butadiene.

A statement was included to the effect that a supplementary report to be published later this month will give some of the more pertinent data on the cost of construction and the operating efficiency of all of the plants in the over-all rubber program. In the meantime it was pointed out that with butadiene from alcohol costing about five times as much as that from butylenes, only the great need for aviation gasoline justifies any but a minimum use of butadiene from alcohol.

Production of Synthetics

Concerning production of the synthetics for the year of 1944, the report estimates that a total of 811,037 long tons of all types will be produced, of which 712,376 will be Buna S, 21,159 Butyl, 57,453 neoprene and 20,049 Buna N. It is further estimated that a total of 460,750 tons of all types will be produced in the first six months of 1945 of which 390,000 tons will be Buna S, 27,550 Butyl, 33,500 neoprene and 9,700 Buna N. It is pointed out that with the exception of the production of Buna N and Butyl, the anticipated capacity of all other synthetics including the raw materials which go into their production exceeds the recommendations made in the Baruch Rubber Report.

Regarding conversion, Col. Dewey stated that the conversion program can only be considered finished when the minimum requirements of crude rubber are no greater than the income of this commodity. Large sizes of truck and bus tires and military tires including aircraft are at present consuming more than 60% of the crude rubber that is being used. Tires and tubes required by the Ordnance Department, the report states, are 82% converted to synthetic and conversions planned for the next few months will bring this figure to 85%. It is estimated that 86% conversion to synthetic will be the optimum that can be accomplished.

Postwar Demand for Tires

According to an interesting article on the rubber situation in the July, 1944, issue of *Fortune Magazine*, entitled "Rubber on the Rebound," Firestone estimates that Americans will buy 92,000,000 tires in the first postwar year with a gradual decline to 73,400,000 in the fifth year, or an annual average of 80,000,000 tires, two-fifths of which will be original equipment tires. Goodrich estimates an average of 76,000,000 in the first five postwar years, Goodyear figures 79,500,000 in each of the first three years, and U. S. Rubber is counting on slightly over 77,000,000 tires in each of the first two years after the defeat of Japan. In the boom year of 1941, the article points out, the rubber industry manufactured only 62,000,000 tires, and in the better-than-average year of 1937 it turned out only 53,000,000 units.

Status of Crude Rubber

The actual monthly consumption of crude rubber for ordnance items is estimated at 3,230 tons per month during the third quarter and 2,438 tons for the fourth quarter of this year. Although tracks and bogies for tanks had been converted largely to synthetic, combat experience has resulted in changes of vehicle design which has necessitated temporary return to the use of crude rubber. In all, military and essential civilian tires and tubes, tracks and bogies for tanks, and fuel cells for aircraft consume approximately 85% of the crude rubber that is being used. The consumption of crude rubber during the first half of 1944 was well within the estimates of the conversion program advanced by the ORD.

In discussing the crude rubber situation, Col. Dewey stated that production from South America has been disappointing and on this subject it appears that the prospects for 1945 are little or no brighter. The report referred to the recent termination of the project in Haiti for the development of cryptostegia and repeated the recent estimate of the Department of Agriculture that approximately 600 long tons of guayule will be produced in this country by the end of June, 1945.

Plans have been prepared whereby approximately 26,000 long tons of guayule rubber may be produced from existent acreage but whether or not this total amount will ever be produced is dependent upon future appropriations by Congress. Until imports of crude rubber are sufficient to supply all needs for such rubber, it is inconceivable that any available source be destroyed and, accordingly, the ORD is recommending holding the present plantings of guayule until at least June, 1945.

In concluding the report, Col. Dewey pointed out that the ORD during the fiscal year ended June 30, 1943, was able to turn back to the Treasury a very substantial percentage of the budget set aside for the payment of salaries and in the next fiscal year will turn back 35% of the budget voted by Congress. The budget on which the Office is now operating for the current fiscal year is only $646,000 as compared with an annual rate of $2,240,000 during the fiscal year ended June 30, 1943. These savings were attributed to efforts made to operate as a business institution with a minimum of personnel and without any unnecessary red tape or duplication of effort.

At the peak of its activities, according to the report, the ORD employed 505 people, of which some were part-time consultants. For the past 12 months this total has been steadily reduced until at the end of July there were less than 250 on the payroll.

Included among new regulations affecting rubber manufacturers issued in recent weeks were the following:

HEELS AND SOLES

Rubber heels being made of higher quality by manufacturers because better materials are now available must be sold at the ceiling prices applicable since November 1, 1943, to lower quality heels, OPA announced on July 29. No increase in ceilings is permitted for the higher quality heels because existing ceilings represent the prices of higher quality heels as sold in March, 1942. Lack of better grade rubber has prevented the manufacture of higher quality heels since shortly after Pearl Harbor.

The changes in the regulations, accomplished by Amendment No. 7 to M.P.R. 477 (Sales of Rubber Heels and Soles in the Shoe Factory and Home Replacement Trades), and Amendment No. 15 to M.P.R. 200 (Rubber Heels in the Shoe Repair Trade), both effective August 3, apply to rubber heels sold by manufacturers and wholesalers to (1) shoe manufacturers for use on new shoes; (2) chain stores and hardware stores for subsequent sale to consumers who wish to place them on shoes in their own homes, and (3) shoe repairing establishments. No changes are made in prices at the retail level.

These changes are accomplished by raising the minimum specifications of rubber heels for which specific ceiling prices are already established. Both minimum abrasions and tensile strength, which are indicative of wearing quality, are increased. Industry was consulted about these changes and generally approved them.

At the same time, manufacturers producing friction scrap soling material for new shoes may apply for a specific maximum price on material having a stitch tear test of 60 pounds, wet and dry. Heretofore such applications could only be made where the stitch tear test was 100 pounds dry and 85 pounds wet. The

abrasion of 45 remains the same. The action automatically revokes a special adjustable pricing authority granted recently on sales of 60 pound stitch tear test material.

ELASTIC WEBBING

New methods by which manufacturers and wholesalers will determine their ceiling prices on elastic webbing, braid and cord, have been established by OPA. These methods, incorporated in Amendment No. 17 to M.P.R. 220 (Certain Rubber Commodities), effective August 14, will even out some extremely high and low ceiling prices of manufacturers, will make no substantial change in the manufacturers' general level, but will substantially reduce the average of wholesale ceiling prices.

The term "elastic webbing" has been broadened to specifically include braid and cord. Retail prices are not covered by the action, but remain under the General Maximum Price Regulation. Shower curtains, typewriter feet and typewriter keys have been deleted from the list of commodities covered by the regulation, as they are already under other regulations.

The changes in the manufacturer's and wholesaler's ceilings have also been made not only because synthetic rubber is now being used for these items but because existing provisions have resulted in a wide variety of ceilings, mainly because in the March, 1942, base month there was reduced production and resulting scarcity.

Manufacturers will determine their new ceilings by taking current synthetic rubber costs, March, 1942, prices of other materials and labor rates, and October, 1941, gross margins. Heretofore all three factors were based on March, 1942, levels, except synthetic rubbers where August 1, 1943, prices were used.

Wholesalers, who heretofore were under the General Maximum Price Regulation and are now brought under the same regulation as manufacturers for the first time, will determine their new ceilings by taking their net purchase cost and adding October, 1941, margins. Heretofore they used their highest March, 1942, prices.

MISCELLANEOUS ORDERS

Included among other new regulations issued by government agencies in recent weeks, of interest to the rubber manufacturing field, were the following:

Due to increased production facilities and improved imports, WPB has removed allocation controls from polyfiber and propylene glycol. The small order exemption for pine tar, previously five gallons a month, is now 54 gallons a month.

Monomethyl amine and dimethyl amine, widely used in the manufacture of rubber accelerators, will be placed under quarterly allocation on October 1, according to WPB's Chemicals Bureau. The material will be added as a schedule of General Allocation Order M-300.

Several additions have been made to the list of brand names covered by ceiling prices in M.P.R. 435 (New Bicycle Tires & Tubes). The additions were covered by Amendment No. 5 to that regulation.

DRASTIC CUT MADE IN AUGUST QUOTA COVERING TRUCK AND BUS TIRES

The serious situation confronting the transportation industry was best expressed in the announcement by OPA on July 27 that the number of large truck and bus tires allowed for rationing during August is the smallest since rationing began. Only 60,000 tires of size 8.25 and larger were alloted for the month, or less than half of the 135,000 certified for July.

During the last four months the quota has averaged between 125,000 and 130,000 heavy duty truck tires monthly, and the Office of Defense Transportation estimates that a minimum of 165,000 large size tires are needed each month during the third quarter to keep the present number of trucks and buses on the road.

To meet the problem of rationing out the greatly reduced quota of 60,000 large size tires, an average of less than a dozen tires for each of the 5,500 local rationing boards in operation, OPA has authorized district offices to form temporary emergency truck tire rationing panels (covered in Amendment No. 83 to Ration Order R-1) to pass upon applications and issue certificates for heavy truck and bus tires. These panels, selected from ration boards within OPA districts, must make certain that trucks most essential to the war effort and the civilian economy secure tires.

The quota for smaller size truck tires has also been reduced for August, being set at 280,000 tires as compared with 375,000 for July. Total August quota for new passenger car and motorcycle tires, as announced in our last issue, is 1,950,000, of which 173,840 are held in national and regional office reserves for meeting emergency needs. This August figure for passenger tires is the same as for July.

August rationing quotas of tractor-implement tires are also about the same as for July. The total for tires 7.50 or smaller is 55,000, of which 13,600 are held in reserve, and for tires larger than 7.50 the quota is 23,000, including 4,600 held in reserve. The July allocation provided 60,000 tires of 7.50 or larger and 23,000 tires larger than 7.50.

(EDITOR'S NOTE: On August 9th it was announced that a supplemental large truck and bus tire quota of 25,000 has been authorized by the Rubber Director for August, bringing the August quota for tires size 8.25 and larger to 85,000 units).

Entire Situation Reviewed

Just prior to the disclosure that only 60,000 heavy duty truck and bus tires would be made available for rationing in August, the War Production Board issued a statement warning of the forthcoming reduction. This statement was issued after the full board of WPB reviewed the entire heavy tire situation and agreed that the Army's requirements for heavy tires must be met at all costs, even though such a decision involved serious risks in the field of absolutely essential civilian transportation.

The WPB statement was interpreted to mean that the Office of Defense Transportation supplies of replacement tires will be reduced from the estimated requirements of 495,000 to between 190,000 and 230,000 for the third quarter, the exact quantity depending on the extent to which tires are used for replacement instead of new equipment. Consequently, tires available for bus and truck use will be sharply curtailed and WPB is calling upon all shippers and others concerned with the bus and trucking situation to reduce their requirements for transportation wherever possible to meet this situation.

The board agreed that the needs of the Army for heavy-duty tires for current operations are so urgent that they must be met even though domestic transportation is seriously handicapped. Army officials at the board meeting said that the service's stated requirements for these tires during the third quarter have been rigorously screened, but agreed to make a careful re-screening to make absolutely certain that no tires not urgently needed for military operations are taken from the domestic economy.

The domestic non-military original equipment tire requirements will be reviewed to see whether up to 40,000 tires may be released from this program to meet the critical domestic transportation needs for replacement tires. The Foreign Economic Administration will reduce its original equipment requirements by 7,100 tires and its replacement tire program by 27,900 tires, WPB said. It is hoped, WPB added, that this cut in requirements of Allied countries will be partially overcome by tire production in other countries — particularly from South American Allies.

Specific Actions Taken

Several actions were taken by government agencies to meet the drastic situation which faces the transportation field as the result of the tire shortages. Included among these was a special preference list drawn up by the War Production Board and the War Food Administration. It was indicated from this list, which will be used as a guide by OPA's newly-created emergency truck tire ration panels, that heavy truck and bus operations assigned top flight priority ratings are the only services likely to receive heavy duty tires until October 1.

The preference list, made available on July 27, include all services requiring

heavy duty tires rated in the order of essentiality in classes 1, 2A, 2B, 3, 4 and 5. In general, it was believed, only Classes 1 and 2 are expected to obtain tires. The list, however, is constituted on a "flexible basis," and exceptions may be made to provide tires to lower-ranking services. Under some circumstances, highly rated services may be denied tires.

Operators are classified in seven groups according to the nature of the services performed, each group being subdivided to designate ratings for off-the-highway and over-the-road operations, wholesale local commercial delivery and service operations, and retail local commercial delivery operations. The list applies only to tires sized 8.25x20 and up.

Some Certificates Cancelled

Another step taken to meet the situation was the decision to cancel all outstanding tire ration certificates dated July 15 or earlier for truck and bus tires size 8.25 and larger. This step was also officially covered by Amendment No. 83 to Ration Order 1A. Approximately 100,000 such certificates are affected by the cancellation, according to OPA. Certificates for smaller size truck tires, 7.50 and under, and for passenger car tires were not affected by the cancellation order.

In explaining the cancellation, OPA said that during April, May, June and July, total large size tire quotas given to OPA for rationing amounted to 504,500, and certificates calling for delivery of that many heavy duty tires were issued by local boards. However, since dealers' stocks already were at a minimum and since manufacturers' shipments during the same four months totalled only 401,140 of these tires, or 103,360 less than quota, a great many certificates could not be used. It is these outstanding certificates, some held by consumers, that have been invalidated.

A revised replenishment procedure, geared to the extreme shortage of large size truck and tractor-implement tires, that dealers must now follow in replacing their stocks of tires, was also set up by the amendment to the ration order. Changes affecting replenishment provide:

1. When a dealer sells a tire to a customer holding a ration certificate calling for a truck tire of size 7.50 or smaller, the dealer may take the replenishment portion of the certificate (Part "B") to his supplier and get either another small truck tire or a small tractor-implement tire.

2. If the certificate against which a dealer delivered a tire called for a large size truck tire, the dealer may replenish his stock only with a truck tire of size 8.25 or larger.

3. A certificate taken in by a dealer calling for a small tractor-implement tire may be used to replenish either with another small tractor-implement tire or with a Grade III (used passenger) tire.

4. A certificate taken in by a dealer calling for a large tractor-implement tire may be used to replenish with another tractor-implement tire of any size, either small or large, or with a Grade III tire.

5. If a receipt (OPA Form R-12) taken in by a dealer called for a truck tire without any size description, it may be used to replenish with a small size truck tire or small tractor-implement tire.

Col. Bradley Dewey
retiring as Rubber Director

ODT Statement on Situation

The shortage of medium and heavy-duty bus and truck tires might prove calamitous, according to an emergency survey report made public by the Office of Defense Transportation. The survey showed that reports have been received from various sections of the country that a comparatively large number of essential medium-and heavy-duty vehicles were out of operation due to the inability to obtain replacement tires. Included in the list of inoperative vehicles are tank trucks used for hauling petroleum products, and others hauling food, war production material, and other vital commodities.

The prospect of getting these trucks into operating condition again is at this time, the report stated, exceedingly gloomy. A number of local as well as intercity bus lines have notified ODT that unless tire replacements were made available at once, curtailment of service would be inevitable.

The report concludes with the observation that the medium- and heavy-duty bus and truck tire shortage affecting as it does transportation highly essential to the war effort, "might well prove a home front calamity" unless some means are found to alleviate the situation.

In commenting on the report, Col. J. Monroe Johnson, ODT director, urged all operators of rubber-tired vehicles to continue, and increase wherever possible, the conservation and service curtailment measures which, in 1943, provided a saving of more than 824,000,000 vehicle miles. This latter statement referred to another ODT survey which indicated that under conservation measures taxicabs are conserving 400,000,000 vehicle miles annually; local rail and bus companies, 218,000,000 miles; school buses, 156,000,000 miles; and intercity buses, 49,000,000 miles.

Other pertinent factors in the tire situation included the statement by the Petroleum Industry War Council that more than 200 petroleum transport trucks are completely out of service at present and the situation is daily becoming more acute because of the severe shortage of heavy duty tires, and the recommendation of the Trailer and Truck Tank Manufacturers Industry Advisory Committee that WPB limit by directive the number of tires which any manufacturer may deliver as original equipment with a new trailer.

Relax Recapping Regulations

Because distribution of tire recapping, retreading and repair equipment is now adequate, WPB has eased up on the regulations covering this type of equipment with the issuance of General Limitation Order L-61, as Amended July 18, 1944.

Any person may place an unrated order with a manufacturer and it may be accepted and filled, but orders which are not approved orders as defined by the regulation, or orders bearing blanket maintenance, repair and operating ratings authorized by other WPB regulations, shall be treated as unrated orders.

An "approved order" means (a) an order for new recapping, retreading or repair equipment authorized on Form WPB 1319; (b) any order for this machinery which WPB has authorized under L-61 before March 23, 1944, to be produced or delivered; and (c) any U. S. Army or Navy order or export order which bears a preference rating.

According to the amended language, a manufacturer must use interchangeable facilities to fill rated orders classified in each higher group before he may use the same facilities for orders in any lower group. In transferring his production to a higher rated order, the manufacturer is allowed 15 days to change over after the higher order is received.

Except for ratings assigned to approved orders and blanket MRO ratings, no person shall apply or extend any ratings to get retreading or similar tire machinery. Any rating purporting to be applied or extended to get this machinery except for ratings assigned to approved orders and blanket MRO orders, shall be void, and no person shall give any effect to it.

Retreading and recapping equipment is defined as any mechanical device used in connection with applying uncured rubber in the form of camelback, patching rubber, etc., to rubber casings or innertubes for the purpose of renewing or repairing them.

CARBIDE CORP. REVEALS POLYETHYLENE PRODUCTION

Permission to reveal its remarkable production record of polyethylene was recently given to the Carbide & Carbon Chemicals Corp., New York City, by the Navy Department. Starting from scratch some two years ago, Carbide is currently producing the Navy's requirements for polyethylene at a rate 600% of the designed capacity of the plant.

According to Carbide officials, a little over two years ago the Navy learned that the company, in collaboration with Linde Air Products Co., an associated concern, had developed a method of producing polyethylene. At that time it was determined that this material was suited to meet the Navy's requirements of an insulation for coaxial cable used in radar equipment.

At the Navy's request, these two companies, working together but entirely independent of anyone else, designed in their own engineering department and built with their own construction organization, a plant to produce polyethylene. Within 13 months from the date the project was authorized, the plant was producing at 180% of rated capacity. Today, as stated, it is producing at 600% of rated capacity.

Polyethylene plastics are inherently flexible, translucent materials that possess many unusual properties. They are entirely new materials, unique in the plastics field as well as in the industrial field. These plastics have excellent insulating properties. They are tough and resistant to shock. The amount of water they will absorb is inappreciable, while films of the material will not permit the passage of appreciable amounts of water vapor. In addition, polyethylene softens at the unusually high temperature for thermoplastic materials of 230° F., above the temperature of boiling water, and remains virtually unaffected by —90° F.

Properties Can Be Varied

Polyethylene plastics are produced under strictly controlled conditions. By changing the conditions of manufacture, the properties of the base resin can be varied to satisfy the needs of particular applications. At the present time only one grade of resin is being produced. Among the properties which can be varied are tensile strength, elongation at break, tear resistance, and brittleness temperature. The properties of the resin indicate that the use of these materials in future years will be extremely widespread.

Because they are colorless as manufactured, the resins can be produced as clear translucent articles or can be formulated in a wide color range offering exceptionally high luster. The plastics are so light that they will float on water. They can be processed by the methods now employed for the older types of thermoplastic materials. They may be extruded, molded, fabricated into sheets and film, and coated on to cloth.

All types of polyethylene plastics are distinguished by a dielectric constant at 50 mc. of 2.29 and a power factor of 0.0003; low water absorption (0.03 per cent weight gain in 100 hours), and low transmission of water vapor; and resistance to attack by many chemicals, including a number of solvents. As these materials are inherently flexible, the use of a plasticizer is unnecessary.

Many Postwar Possibilities

The excellent electrical properties of the resin are of primary importance in present-day uses and suggest many applications when greater quantities are available. Their chemical inertness, low moisture transmission, inherent flexibility, and toughness indicate that the resins will be used in the manufacture of many products such as washers, gaskets and other molded articles; films; coated fabrics and paper; collapsible tubes; tubing; filaments; and many other similar articles.

Nubun Latex Insulation

A new synthetic latex insulation for power, lighting and communication cable, known as Nubun, has been developed by the U. S. Rubber Co. The new insulation will permit the design of new types of wire and cable with improved electrical and physical characteristics. It is made by the continuous dip method and qualities claimed include flexibility, impermeability to water, laminated construction, and perfect centering of the conductor to produce an insulated wire of maximum conductivity and minimum diameter. Nubun is said to be exceptionally homogeneous following vulcanization and has high electrical characteristics. It is also low in specific conductive capacity. Nubun insulation is made from a special modification of Buna S. Laboratory tests have shown that Nubun, before aging, has a tensile strength of 2500 pounds, an elongation of 2 to 13 inches and a permanent set of 5/16-inch. After 96 hours of aging in an oxygen bomb, its tensile became 2000 pounds and its elongation 2 to 11 inches.

AUSTRALIAN MISSION VISITING U. S. TO STUDY SYNTHETIC RUBBER

A nine-man mission representing the Australian government and the rubber industry of Australia is currently in the United States for the purpose of studying the processing of synthetic rubber and its uses in manufacturing rubber goods, looking towards the extended use of synthetic rubber by the industry in Australia. They plan to visit various types of factories manufacturing miscellaneous rubber goods during their extended stay. The accompanying illustration shows four members of the mission visiting the Goodyear Tire & Rubber Co. plant in Akron. They are, reading from left to right, W. J. Condon, general superintendent of the Goodyear Tire & Rubber Co. of Australia; G. Pattison of the Hardie Rubber Company; D. Preistly of the Dunlop Rubber Co.; and Major C. Harle of the Australian Army.

SPECIAL REPORT OF THE RUBBER DIRECTOR

(Recommending Termination of Special Powers July 25, 1944)

It is now almost two years since the Rubber Survey Committee, composed of Mr. Bernard M. Baruch, Dr. Karl T. Compton and Dr. James B. Conant, stated:

"Of all critical and strategic materials, rubber is the one which presents the greatest threat to the safety of our Nation and the success of the Allied cause. Production of steel, copper, aluminum, alloys, or aviation gasoline may be inadequate to prosecute the war as rapidly and effectively as we could wish, but at the worst we still are assured of sufficient supplies of these items to operate our armed forces on a very powerful scale. But if we fail to secure quickly a large new rubber supply our war effort and our domestic economy both will collapse. Thus the rubber situation gives rise to our most critical problem."

Today, as is shown in Progress Report No. 6 of the Office of Rubber Director, this most critical problem has been solved.

In its report the Baruch Committee emphasized the need for new steps to ration and conserve rubber, recommended the release of more rubber to maintain necessary civilian driving, emphasized the necessity of highest priorities for the materials needed to build the plants for the processes then approved, and recommended the appointment of a Rubber Director with broad powers which cut across the organizational responsibilities and authorities of many established agencies. Emphasizing the necessity of keeping our Armed Forces fighting and our essential civilian wheels turning, it stated:

"This can best be done by 'bulling through' the present gigantic rubber program and by safeguarding zealously every ounce of rubber in the country."

As recorded in the six progress reports of the Office of Rubber Director, these recommendations have served as a guide to its work. Subject only to very minor departures, they have been carried out.

Today, the plants of the synthetic rubber program are built and operating. Products which formerly required 80% of the crude rubber consumed are now being made with synthetics and further conversions, which are already planned and which will go into effect within the next few months, will further cut down the consumption of crude so that the country will be in a position to live within its income of new crude rubber. A stockpile of over 100,000 tons of rube rubber is still on hand and a stockpile of 104,000 tons of synthetics has been built up. Recapping and the necessity of conserving rubber have been accepted by the public.

The Rubber Reserve Company comprises a well-staffed organization. Until such time as ways are found for the plants to go into private hands, it is fully qualified to oversee and coordinate the efforts of the many outstanding companies selected by them to operate the synthetic rubber plants and to oversee the transportation and storage of the resultant synthetics as well as the crude rubber stockpile.

Six pilot plants are being built to pilot improvements in the processes for making GR-S, commonly known as Buna S synthetic rubber. Laboratories in Akron owned by Rubber Reserve Company are being operated by the University of Akron to manufacture on a small scale and evaluate new types of synthetic rubbers including those presented by companies not possessing adequate piloting facilities. A test fleet is being operated in Texas for the Government by a group of the smaller tire manufacturing companies. The research facilities and test fleet give all manufacturing companies, large and small, equal opportunity. They should be continued under suitable direction as a safeguard for the future until such time as a mechanism can be devised to place the new synthetic rubber industry in the hands of private enterprise.

The rubber goods manufacturing industries have been expanded so that their facilities will soon be adequate to permit manufacturing all of the rubber goods now essential to the prosecution of the war and the maintenance of essential civilian activities. The requirements of the rubber goods manufacturing industry for rayon and cotton tire cords, various types of carbon blacks and special chemicals have been determined by the Office of Rubber Director and presented to those divisions of the War Production Board which are responsible for seeing that the demands are met.

The requirements for manpower have been presented repeatedly to the War Manpower Commission which is responsible for seeing that adequate manpower is available to the rubber goods manufacturing plants as well as the synthetic rubber plants.

In short, the program has been carried to a point where with reasonable manufacturing efficiency, only the failure of those responsible to supply adequate manpower, or essential components other than rubber, can result in a shortage of essential rubber goods of high quality.

Given adequate supplies of men and components, a very small, ably staffed and well directed group should be able, with the cooperation of the rubber goods manufacturing industry, to watch over changing conditions so that essential demands are met and the industry properly guided through the reconversion period. When crude rubber is again available, it will be necessary to see that small companies are equitably treated until it is freely available to all.

In view of the above, I feel that there is no reason to maintain further the broad powers that were given to the Rubber Director only because they were essential to the meeting of an emergency which now no longer exists. Consequently, I am recommending that the Office of Rubber Director be abolished and that priority powers incident to the allocation of rubber goods and such regulation as the rubber goods manufacturing industry may need, as well as the determination of the industry's needs for products which are in short supply, be given to a Rubber Division within the War Production Board. This Rubber Division might well report to the Chairman or the Executive Vice Chairman and be organized similarly to and operated in the same general way as the Steel and Aluminum Divisions of the War Production Board. Once the War Production Board has determined the essentiality of a program, its Production Executive Committee, which includes representatives of the Armed Forces, is the ideal body to insist that adequate manpower be provided.

Such a Division could cause Rubber Reserve Company to supply the requirements of synthetics and Rubber Reserve Company could negotiate where necessary with the Petroleum Administration for War for its requirements of raw materials from petroleum. Debatable points could be appealed to the Director of War Mobilization.

Research incident to the improvement of present processes for the manufacture of synthetics should be carried forward under the direction of Rubber Reserve Company in accordance with already determined and approved policies. Research pertaining to the piloting and evaluation of new synthetics should be overseen, with the aid of a consulting board, either by the Rubber Division of the War Production Board or the Rubber Reserve Company. The objects of such research have been clearly defined and the organizations and policies therefor well set and functioning. Under such a set-up new provisions governing conversions from the use of crude to synthetics and vice versa during the first months after more crude rubber is available, would be governed by this Rubber Division of the War Production Board which would presumably (1) utilize the services of men who know the problems and (2) continue to operate with the help and advice of rubber industry technical committees.

The new Rubber Division of the War Production Board should have the close cooperation of the Office of Defense Transportation and the Office of Price Administration.

The proposed new set-up provides for the handling of present and future day to day problems incident to rubber in the same way that these problems are handled for other products within the War Production Board. It would do away with certain overlapping and duplicating of functions inevitable to the continuance of the present set-up.

The above recommendations are influenced by the recommendation in the re-

port of Bernard M. Baruch and John M. Hancock of February 19, 1944 entitled "Report of War and Postwar Adjustment Policies" in which they stated that "All controls and the war agencies administering these controls should be liquidated when no longer necessary." The controls exercised by the Rubber Director over outside agencies are no longer necessary.

I recommend that the above changes be made effective September 1 of this year or at such earlier time as may be conveniently arranged.

BRADLEY DEWEY,
Rubber Director.

JULY 25, 1944.

Establish New Dayton Firm

Plastic & Rubber Products, Inc., a newly-organized rubber and plastics manufacturing firm, will shortly occupy a factory now under construction at 3110 Oakridge Drive in Dayton, Ohio. The new company, partially financed by Defense Plants Corporation funds, will manufacture products for the automotive and aeronautical industries, and will represent a total investment of $200,000. Officers of the new concern include MacNeel Pierce, president; H. G. Taylor, executive vice-president and general manager; N. O. Hulsey, vice-president; William G. Kiefaber, treasurer; and Arthur W. Meyering, secretary. Some of these officers are connected with the Plastics & Rubber Products Co., of Los Angeles. Mr. Taylor, the general manager of the new firm, has served as consultant for the Los Angeles company.

Schulman Akron Plant Razed

The large scrap rubber plant maintained by A. Schulman, Inc., at 790 East Tallmadge Ave., Akron, was completely razed by fire on August 3. Damage was estimated at approximately $350,000. The fire, believed to have started from sparks struck by a passing freight train, was one of the most spectacular in the history of Akron, some 50 people being hospitalized from injuries suffered in fighting it. The Schulman plant employed 125 and fortunately most of the workers had gone home before the conflagration started. Officials of the company report they hope to rebuild shortly so that operations may be resumed as quickly as possible.

Takes Over K & W Rubber

Michael J. Broderick, who has been operating the Broderick Rubber Co. in Chicago, Ill., for the past several months, has purchased the K & W Rubber Corp., Delaware, Ohio, from J. H. Johnson. Mr. Broderick has taken over the Delaware plant and will continue operations under the name of K & W Rubber, not incorporated. The shoe soles and other K & W rubber products will continue to be manufactured at the plant which now employs approximately 20 people.

Signal Corps Saves Rubber

More than 12,000,000 pounds of crude rubber were conserved by the Signal Corps of the U. S. Army in the first four months of 1944 through the use of synthetics and alternate materials in thousands of procurement items, thereby reducing their crude rubber requirements from 2,626,000 pounds in June, 1943, to approximately 800,000 pounds in April, 1944. The largest savings have been effected through the use of substitutes in the production of field wire and telephone cable assemblies. Further changes in design and production techniques are steadily decreasing the use of crude rubber in Signal Corps equipment.

Ridacto—Accelerator Activator

Ridacto, an activator for the thiazole type accelerators, has been introduced by the Ridbo Laboratories, Inc., 111 Pennsylvania Ave., Paterson, N. J. Described as a mobile liquid with a specific gravity of 1.06, the new material may be effectively used by reducing the primary thiazole accelerator and activating with Ridacto in a proportion to produce the desired curing rate. When Ridacto is used, according to Ridbo Laboratories, the persistent effect of the thiazoles is partially eliminated and vulcanizates with improved tear resistance and excellent retention of tensile and elongation after aging are obtained. Danger of scorching is also said to be elimi nated.

Extend Use of Pliobond

Originally developed as a means of bonding wood to metal, Pliobond, the organic cement recently announced by the Goodyear Tire & Rubber Co., Akron, can now be used to bond any two desired materials together. As a result, Goodyear scientists are prepared to offer the postwar world a whole new array of building materials combining desirable structural qualities with beauty and low cost. They expect these to find innumerable uses in the construction of industrial and commercial buildings, homes, airplanes, furniture, streamlined trains and other numerous necessity items.

A practical new folding ladder has been developed by the Duo-Safety Ladder Corp., Oshkosh, Wisconsin. It folds into a bundle, 3 inches by 3 inches, and is equipped with special type shoes which provide a maximum safety for a ladder of this type.

The adaptation of Pliofilm for collapsible tubes and packaging has been disclosed by Goodyear. It will be used for toothpaste, shaving cream and similar articles.

WPB CHEMICALS BUREAU URGES INCREASED USE OF MPC BLACK

Because the increased demand for easy processing channel carbon black (EPC) has reduced production in the channel black industry by approximately 15%, the Chemicals Bureau of the War Production Board issued a statement on August 5 urging all members of the rubber manufacturing industry to replace their EPC requirements with medium processing channel black to the fullest possible extent.

Where the direct substitution is not possible, Chemicals Bureau officials suggested a blend with semi-reinforcing furnace or high modulus furnace, or use of high modulus alone. It was said that this could be done without any loss in quality in the finished product and, in many cases, would result in an improvement. Because of the increased demands, Chemicals Bureau officials said that it had in many cases been necessary to deny or cut August allocations for channel carbon black.

This situation is expected to be cleared up by the end of the year, officials explained, since new production of both channel and furnace carbon blacks is scheduled to be brought in each month throughout the rest of the year. However, there is enough carbon black now being produced and in stock to meet 1944 requirements fully, it was asserted.

Since January 1, 1944, production of all grades of furnace carbon black has been increased from less than 100,000,000 pounds a year to more than 430,000,000 pounds a year. When the present program is completed in the early part of 1945, production will be at a rate of 625,000,000 pounds a year, officials said.

Channel black production also is being increased monthly. By March, 1945, it should be at a rate of over 600,000,000 pounds a year, bringing the grand total to more than 1,200,000,000 pounds per year of all black for the rubber industry.

Chemicals Bureau officials said that short supplies of natural gas and state restrictions have delayed production of easy processing black to such an extent that 1945 rubber requirements for easy processing black have been reduced by 50,000,000 pounds. This has been balanced by an increase of the same amount in the requirement for furnace black.

New Swedish Synthetic Factory

Due to the marked shortage of crude rubber imports, the Swedish Riksdag has appropriated 20,000,000 crowns (about $5,000,000) for the immediate construction of a synthetic rubber factory, according to a statement recently released by the American-Swedish News Exchange. Sweden now obtains a small amount of synthetic rubber from Germany in exchange for other materials more vitally needed by that country, but this is not nearly sufficient to make up for the drastic curtailment of crude rubber imports.

BRITISH RUBBER FEDERATION OUTLINES POSTWAR PROBLEMS

The extent to which the rubber industry in England will be able to contribute to the revival of national trade in the postwar period was recently outlined in a memorandum presented to the British Board of Trade by the Federation of British Rubber and Allied Manufacturers Associations. The memorandum points out that the Federation represents 24 trade associations, all largely dependent on rubber as a common raw material, with 288 manufacturing firms and more than 300 factories in Great Britain. The present employment roll of approximately 50,000 is expected to rise to 65,000 on the resumption of normal trade.

According to the memorandum, synthetic, no matter how freely available, cannot yet be regarded as a complete substitute for natural rubber in some important products. It is therefore desirable to emphasize that the entire industry can neither provide maximum employment nor recover its pre-war productivity unless and until an adequate volume of natural rubber is at its disposal.

Advocate Price Stabilization

The stabilization of the price of rubber at a reasonable level for a specified postwar period is advocated and the importance of other industries being able to supply ancillary materials stressed. The products of the textile industry, for example, are essential to many branches of the rubber trade, including tires, conveyor and transmission belting, hose, footwear and sports goods.

As far as production capacity goes, this has been increased in some sections of the industry, particularly for specialized and government-assisted work. With the possible exception of the reclaim section, the Federation does not consider that there will be any post-war difficulty in employing such additional capacity as has resulted from war production.

In dealing with the labor needed, the Federation urges that special consideration should be given to the early release of: (a) electrical, mechanical and maintenance engineers; (b) pivotal workers upon whom the employment of others will depend.

The memorandum points out that the re-establishment of many other industries must depend upon the ready availability of rubber component parts. For example, manufacturers of motor cars and commercial vehicles will not be in a position to attain their potential of production and employment unless tires and other rubber parts are available for the finished vehicle.

In regard to equipment, the Federation sees no likelihood of postwar production being handicapped by the inefficiency of equipment. Overworked equipment and obsolescent machinery can be replaced in accordance with normal procedure and it is considered to be a matter of urgency that taxation should be amended to permit adequate reserves to be built up during the war for this purpose.

The removal of government stores from production shops, if postponed, will, it is pointed out, obstruct re-employment and the Federation accordingly requests that it be given details of premises and equipment likely to be surplus to Government requirements, so that the industry may have early opportunity of acquisition.

Most, if not all, sections of the industry, the memorandum states, have been required to degrade their products in order to conserve rubber. In the interests of consumers, and of national and international quality reputation, the Federation urges the earliest possible post-war return to pre-war quality levels or higher.

As a substantial demand is expected after the war, and as natural rubber will not be freely available, the continued controlled allocation of rubber and other raw materials may be unavoidable. The Federation is therefore of the opinion that, for as long as it may be essential, the control of raw material issues should be exercised by the appropriate department of H. M. Government. It is suggested, however, that allocations should be made in cooperation with representatives of the Federation.

Postwar conditions, the memorandum points out, will embody many more complications than now exist, including those represented by the competing claims of home and export business, and since policy as well as procedure will be involved in the postwar allocation of raw materials, the Federation feels itself qualified to share the responsibilities of control. Distribution, it is urged, must be freed from all the regulations and restrictions now in force, otherwise congestion may obstruct that free flow of goods which is a necessary corollary to revived production.

On the question of surplus stocks, the Federation is prepared to consider the formation of a re-purchasing company to act for the entire industry. Each section of the rubber manufacturing industry, acting through the Federation, should be given the opportunity, says the memorandum, of repurchasing the goods supplied by its members and eventually regarded as surplus to postwar requirements.

In making this proposal, the memorandum explains, no unreasonable financial or other advantages are being sought. The Federation merely wishes to avoid all those unfortunate features which accompanied the disposal of some surplus stocks after the 1914-18 war. The promiscuous sales of such stocks will delay the employment of labor in the manufacture of new goods and will tend to concentrate surplus goods in few hands, thus penalizing the consumer.

No Special Problems Anticipated

Summing-up postwar prospects, the memorandum expresses the opinion that, given the required materials and labor, the industries represented by the Federation will be able to resume peace-time production without any considerable delay.

In conclusion, the memorandum states that the Federation wishes to emphasize the vital part which transport must inevitably play throughout postwar reconstruction. To an appreciable extent, re-employment will be influenced by the ease of goods movement and there is no need to stress how essential to transport are many of the products of Federation members. It is therefore submitted that the needs of the British rubber manufacturing industry, in relation to postwar production, justifiably merit some priority of consideration.

Comparison of Tire-Company Sales-Profits

BASED UPON 1942 AND 1943 TIRE-COMPANY REPORTS

	Sales		*Profits*	
	1943	1942	1943	1942
Armstrong	.....	.....	$ 451,582	$ 350,558
Dayton	$ 17,892,636	$ 14,063,151	620,622	521,053
Firestone	545,389,601	352,693,500	15,183,382	12,481,129
General	51,987,521	32,944,784	1,740,084	1,382,963
Goodrich	374,408,710	238,784,372	11,584,501	9,524,706
Goodyear	760,491,044	451,493,034	21,479,048	14,370,911
Lee	25,236,489	18,725,101	1,241,934	1,144,765
Mohawk	5,290,995	3,685,505	354,433	348,947
Norwalk	5,984,863	4,003,470	162,165	142,350
Seiberling	18,273,872	11,681,388	609,301	732,928
United States	422,271,343	290,992,037	14,163,554	8,381,011
Total	$2,227,227,074	$1,419,066,342	$67,590,606	$49,381,321
Percentage Increase Sales	36%		Percentage Increase Profits	41.8%

Note: This comparison was compiled by *Tire Rebuilders News*.

Army "Weasel" Revealed

The Ordnance Department of the Army Service Forces has announced that for nearly two years, a new type military vehicle has been in secret production at the Studebaker Corp. plant in South Bend, Indiana. The vehicle, known as the "weasel," is propelled by a special rubber track, designed and developed by the B. F. Goodrich Co. It is declared capable of operating over a greater variety of terrain conditions than any other mobile machine now in service. Key to the "weasel's" ability to roll over surfaces impossible to conventional wheel and other track-laying vehicles, is its light weight combined with broad tracks which extend the full length of its low-slung body. The car, used as a personnel and cargo carrier for Arctic reconnaisance or commando raids, seemingly skims along the ground, exerting ground pressure only about one quarter that of a fully equipped infantryman.

Discuss Contract Terminations

Representatives of various rubber companies recently met in Washington with officers assigned by the Army and Navy to handle contract termination problems and procedures. The Services have not yet prepared all forms and instruction pertaining to terminations and since the Contracts Settlement Act of 1944 is now in force it is important that any company wishing to offer suggestions relative to instructions or directives, which will probably be issued by the Director of Contract Settlement, do so at an early date. To avoid duplication of suggestions, the Services have suggested that comments from rubber manufacturers be sent to the Rubber Manufacturers Association, 444 Madison Ave., New York City, for compilation, after which recommendations will be sent to the Services and to the Director of Contract Settlement.

Synthetic Rubber-Coated Cloth

A new glass, flameproof, synthetic rubber-coated cloth for use in combat planes has been developed by the U. S. Rubber Co. Its main features are great tensile strength at abnormally high temperatures, extreme lightness in weight and high tear resistance. In addition, it is fireproof, gasoline-proof, oil and greaseproof, waterproof, mildew and insect proof and unaffected by acids and alkalies. Double-coated, this glass cloth is being used for gun bore aligning targets, because it retains its shape without stretching or distortion of the gun sighting pattern. The finished weight of the double-coated glass cloth is only 7.6 ounces a square yard, and the single-coated cloth, used for metallic hot-air ducts, weighs only 5 ounces a square yard. The cloth is made in a variety of gauges from .006 to .040 and in tensile strength from 165 to 800 pounds an inch.

Named Purchasing Director

Stanley W. MacKenzie

Stanley W. MacKenzie, former assistant to the director of purchases, has been appointed director of purchases of the U. S. Rubber Co. to succeed George M. Tinsdale, recently elected a vice-president and member of the executive committee of the company. Mr. MacKenzie first joined U. S. Rubber in 1920 at its New Haven, Conn., branch. In 1932 he became purchasing agent of the mechanical division at Passaic, N. J., and eight years later his duties were enlarged to include the supervision of purchasing and inventory control at the Bristol, R. I., Providence, R. I., and Sandy Hook, Conn., plants. In 1941 Mr. MacKenzie was made assistant to the director of purchases and held that position until his present promotion.

Established in New Quarters

The recently established Chemical Division of the B. F. Goodrich Co. is now located in the Rose Building, Prospect Ave. and East 9th Street, Cleveland, Ohio. These new quarters include a modern laboratory in which chemicals and plastics manufactured by the company for war uses will be developed, tested and demonstrated. The general offices of the Philadelphia Rubber Works, a subsidiary of the B. F. Goodrich Co., will also be located at the Cleveland address.

Appoint Advisory Committee

The Coumarone-Indene Resin Manufacturers Industry Advisory Committee has been set up by the War Production Board. Members of the newly-formed committee are: Lee V. Dauler (Neville), R. W. Ostermayer (Pennsylvania Industrial Chemical) and R. C. Quortrup (Barrett). George H. Sollenberger is the government presiding officer.

Synthetic Rubber Adhesives

A new line of industrial adhesives from synthetic rubber has been developed by the B. F. Goodrich Co., Akron. One adhesive is for general utility use and will adhere to almost any clean surface. Synthetic cements are also available for heat vulcanization, air curing or cold adhesion. These adhesives have a non-toxic quality and will give the same bond, when used with cured or uncured neoprene, that rubber cement gives natural rubber. For metal adhesion, two special cements in the Plastilock 300 series have been developed. The first is used with vulcanized neoprene when it is bonded to porcelain, metal and other materials, while the second is used with uncured neoprene for the same purpose.

Technical Adhesive Committee

A new standing technical committee, to be known as Committee D-14 on Adhesives, has been organized by the American Society for Testing Materials to function in the field of adhesives, including, rubber adhesives. A preliminary statement of the scope of the committee calls for the formulation of specifications, methods of tests and a definition of terms pertaining to adhesives, including animal, vegetable, mineral and synthetic types. A number of sub-groups are to be appointed to be responsible for various specific projects in the field. T. R. Truex, Principal Wood Technologist, U. S. Forest Products Laboratory, Madison, Wisconsin, has been appointed temporary chairman of the new committee.

New Plastic Foam

A new type of plastic foam that is lighter than rock wool, glass or cork and lower in heat conductivity than any of these three materials has recently been developed by the General Electric Co. The new material is self-raising and self-curing and will begin to foam, or expand, within 2 to 5 minutes after the mixing stops and cures without the application of heat or any other element. According to General Electric engineers, it foams to 30 times its own size and weighs less than 2 pounds per cubic foot and is particularly suited for insulation.

Additional "E" Awards

Included among companies receiving the Army-Navy "E" award in recent weeks for production efficiency were the following:

American White Cross Laboratories, Inc., New Rochelle, N. Y.

Industrial Rubber Goods Co., St. Joseph, Mich.

Resistoflex Corp., Belleville, N. J.

In addition to the above, renewal stars, indicating continued efficiency, have been awarded to the Shelbyville Mills of the U. S. Rubber Co., Shelbyville, Tenn., and to the Acushnet Process Co., New Bedford, Mass.

NAMES IN THE NEWS

CLARENCE L. WANAMAKER, production manager of munitions for the U. S. Rubber Co., has been named general manager of the company's munitions division, succeeding ERNEST G. BROWN, recently named general manager of mechanical goods and other divisions.

PAUL W. WATT, associated with the B. F. Goodrich Co. since 1915, has been named manager of all of the company's factory service departments. He has been acting as staff manager of the service division.

R. B. BOGARDUS, assistant manager of crude rubber purchasing for the Goodyear Tire & Rubber Co., at present on loan to the Rubber Development Corp., completed twenty-five years of service with Goodyear recently and received his 25-year emblem and cash award.

V. A. SPINA, connected with the Scandinavia Belting Co., Newark, N. J., for the past 23 years, and formerly assistant treasurer of that company, has been elected treasurer and general manager, succeeding the late FRANK J. BOWERS.

ALBERT W. COLEMAN, associated with Manning, Maxwell & Moore, Inc., Bridgeport, Conn., for the past 23 years, has been appointed sales manager of that company.

RICHARD M. FREEDMAN, formerly vice-president of the Piedmont Shirt Co., has been named vice-president and general manager of Rain-Fashions, Inc., of New York City, a new organization to specialize in women's and misses' rainwear of Koroseal.

W. H. FEHRS, plant manager of the Cicero, Ill., plant of the Union Asbestos & Rubber Co., has been appointed assistant to the president of that company in charge of railroad sales.

A. MORTON COOPER, who has been associated with the general mill section of the industrial department of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penna., since 1942, handling rubber, paper, textiles, etc., has been appointed manager of that section.

R. C. WICKERSHAM, with the Koppers Co., Pittsburgh, Penna., since 1914, has been named assistant general manager of the company's tar and chemical division.

WALTER L. ROBINSTINE, formerly connected with the old Martin Custom Tire Co., at Salem, Ohio, has joined the Dayton Rubber Mfg. Co., at Dayton, Ohio, as assistant plant manager.

ALEXANDER JOHNSTON, managing director of the North British Rubber Co., of England, was recently elected president of the Federation of the British Rubber and Allied Manufacturers Association.

CHARLES L. SAUNDERS, former vice-president of the Minneapolis-Honeywell Regulator Co., has resigned as branch chief of the Office of Civilian Requirements of the War Production Board, to become vice-president of the Wheelco Instruments Co., of Chicago.

THOMAS C. YARNALL, manager of sales planning for the B. F. Goodrich Co., has been loaned to the government for postwar planning activities. He will serve as adviser on the staff working with the special House committee on postwar economic policy and planning.

LEROY S. CONVERSE, of the Standards Department of the American Viscose Corp., has been appointed secretary of the Tire Cord and Fabrics Section of Committee D-13 on Textile Materials of the American Society for Testing Materials.

AUGUST ROOSEBOOM, associated with the Shell Union Oil Corp. in an executive capacity for the past six years, has joined R. W. Greeff & Co., New York City, as a vice-president.

MELVILLE M. WILSON, formerly connected with the Interchemical Corporation, has been appointed sales manager of R-B-H Dispersions, Inc., Bound Brook, N. J., an Interchemical subsidiary.

DR. R. P. DINSMORE, vice-president in charge of research and development of the Goodyear Tire & Rubber Co., recently received his 30-year service pin from that company. He joined the company in 1914 shortly after being graduated from M.I.T.

JOSEPH S. HART, formerly export manager of J. M. Huber, Inc., New York City, has been appointed assistant general manager of that organization.

WILFRED L. LARKIN, treasurer of the Boston Woven Hose & Rubber Co., has been elected president of the Boston Control of the Controllers Institute of America.

LESLIE A. GILLETTE, formerly leader of the Rubber Chemicals Group of the Research Department of Sharples Chemicals, Inc., Wyandotte, Mich., has been made chief chemist of that company.

HARRY E. HUMPHREYS, JR., vice-president and chairman of the finance committee of the U. S. Rubber Co., has been named chairman of the newly-created taxation committee of the National Association of Manufacturers.

JAMES DUDLEY RANSOM, former assistant sales manager of the chemical division of the Woburn Chemical Corporation (N.J.), Harrison, N. J., has been appointed sales manager of that division. He joined the company in 1934 as a research chemist.

SIR ARCHIBALD VYVYAN BOARD, senior economy officer of the British Ministry of Supply, was recently appointed Rubber Controller of England, succeeding COL. E. GORE-BROWNE, resigned.

T. S. JOHNSON, formerly associated with the Anaconda Wire & Cable Co., as general manager of Anaconda Mills, with headquarters at Hastings-on-Hudson, N. Y., is now with the Essex Wire Corp., Detroit, Mich., in an engineering capacity.

SHERMAN H. DALRYMPLE, international president of the United Rubber Workers of America, is one of six labor leaders selected to visit England and the battleground in France to determine for themselves the drastic need of certain types of military equipment.

ROBERT T. ARMSTRONG, associated with the General Laboratories of the U. S. Rubber Co. at Passaic, N. J., since 1937 as a research chemist, is now engaged in a similar capacity with the North American Rayon Corp. at Elizabethton, Tenn., working on high tenacity rayon development.

CHARLES BERLOW, who joined the Carr Manufacturing Co., Bristol, R. I., recently as chief chemist, has been made superintendent of that company's plant.

HOWARD PAINTER, assistant treasurer and manager of the Barberton, Ohio, office of the Midwest Rubber Reclaiming Co. for some years, has been elected secretary-treasurer of that company, succeeding the late W. A. HART. WILLIAM H. BAKER, who has been connected with the company for many years, has been named assistant secretary-treasurer.

A price reduction of 5c per pound on certain polyethylene glycols and Carbowax compounds has been announced by the Carbide & Carbon Chemicals Corp., New York City.

Nine drums of dust were recently sent to the Donaldson Co., St. Paul, Minn., manufacturers of air cleaners for the engines of automotive equipment, from Goodyear Farms, Litchfield Park, Arizona. The company uses the dust to test its air cleaners.

Amendments to Ration Order

Five amendments to Ration Order 1A (Tires and Tubes) have been issued since our last report, as follows:

Amendment No. 79, issued July 17 and effective July 25, restricts authority for truck tire inspections to stations having facilities and personnel capable of doing a thorough job and provides for the designation by District Directors of "official truck and passenger tire inspection stations." The amendment also requires that all truck type tires which are unfit for further use be identified at the time of the first replacement by notching the bead of the tire.

Amendment No. 80, issued and effective July 15, simply amends Section 1315.804 (j) (1) of the regulation by substituting the date July 31, 1944, for that of July 15, 1944.

Amendment No. 81, issued July 29 and effective August 2, provides that vehicles used in farm operations may be equipped with used truck tires if any are available. Hitherto, farm tractors, farm implements and farm wagons were eligible for industrial tires, tractor implement tires and Grade III (used passenger) tires only.

Amendment No. 82, issued July 29, and effective August 2, provides that dealers who discontinue the sale of tires may transfer the replenishment portions of their tire certificates if the person to whom they are transferred expects to continue to sell tires at the same establishment. Written permission for the transfer must be secured.

Amendment No. 83, issued July 29 and effective July 30, establishes "emergency truck tire boards" and sets up new regulations for dealers to follow in handling replenishment certificates. It also calls for the cancellation of all outstanding tire ration certificates dated July 15, 1944, or earlier for truck and bus tire sizes 8.25 and larger. This amendment is discussed in further detail elsewhere in this issue.

New Plant For Firestone

A new $4,000,000 tire plant, to be leased and operated by the Firestone Tire & Rubber Co., at Des Moines, Iowa, has been announced by the Defense Plants Corporation. The DPC further stated that it had authorized a loan of $1,750,000 for the acquisition of equipment for the plant. This new plant is one of five authorized in the expansion program undertaken last year by the rubber industry.

Plan New Goodrich Laboratory

Plans have been announced for a large new research laboratory by the B. F. Goodrich Co., of Akron, and options have been taken on tracts of land in the vicinity of Brecksville, Ohio, for that purpose. Company officials have announced, however, that no decision will be reached for several months regarding the exercising of these options or the proceeding with any building program.

Bell Joins Hycar Organization

Frank E. Bell

Frank E. Bell, formerly technical service representative for the Barrett Division of the Allied Chemical and Dye Corp., has been appointed technical service engineer for the Hycar Chemical Co., Akron. Prior to Barrett, Mr. Bell was with the Bolta Corp., the Johnson Rubber Co., and the Aetna Rubber Co. He is a graduate of the Case School of Applied Science and has done special work at the Massachusetts Institute of Technology. He is also a member of the Rubber Division of the American Chemical Society.

Semon Named Lecturer

Dr. Waldo L. Semon, director of synthetic rubber research of the B. F. Goodrich Co., has been selected as the Goodyear Lecturer of 1944 by the Goodyear Lecture Committee of the Rubber Division, A.C.S., for his outstanding contributions in the chemistry and technology of rubber. It was planned that his lecture be presented at the Fall Meeting of the Rubber Division, but since this meeting has been canceled due to wartime exigencies, it is probable that it will not be delivered before the Spring meeting next year.

Dewey Awarded SCI Medal

Rubber Director Bradley Dewey has been awarded the Chemical Industry Medal for 1944, annual award of the American Section of the Society of Chemical Industry, for his work in colloid chemistry, especially as pertaining to rubber latex, and his accomplishment in administering the synthetic rubber program during the critical war period. Col. Dewey's work in latex has been done at the Dewey and Almy Chemical Co., which he founded in 1919 along with Charles Almy. He has been president of that organization since its inception.

Study Postwar Rubber Controls

According to a report from Washington on August 10, the United States, Great Britain and the Netherlands have agreed to study postwar world rubber production and requirements as a preliminary on some sort of international rubber control program. This was the first official statement on the rubber parley currently being held in London by representatives of industry and government of the three countries. The members making up the American delegation, including Paul W. Litchfield of Goodyear and John W. Collyer of Goodrich, were reported in full in our last issue. It has since been learned that P. H. Westerman, head of the economic section of the Ministry of Colonies, is acting as chairman of the Netherlands delegation, which includes Lt. Col. J. T. Cremer, rubber administrator of Sumatra; Dr. P. Honig, member of the Board for the Netherlands Indies, Surinam and Curacao; and A. A. Pauw, managing director of the Netherlands Trading Society.

Rayon Yarn Developments

Industrial Rayon Corporation, Cleveland, plans to start production in its new rayon tire yarn departments at its Painesville, Ohio, plant by August 26 and has issued a call for 600 additional employees. The immediate expansion will more than triple the plant's original yarn-producing capacity. The Enka, N. C., plant of the American Enka Corporation has announced that it has already put its new spinning machines into operation for the manufacture of high tenacity yarn. It was also learned that Excelsior Mill No. 2, the newest mill of the Deering, Milliken & Co. interests, has begun production of rayon tire cord at Clemson, S. C. The cost of this plant is estimated at $2,000,000. To meet increased military requirements for high tenacity rayon tire cord, as well as smokeless powder, WPB is requiring producers of cotton linters to set aside 80% of their output that is acceptable for chemical use for delivery to the Commodity Credit Corp.

Reclaim Advisory Committee

The formation of the Reclaimed Rubber Manufacturers Industry Advisory Committee has been announced by WPB. The committee includes Carl Schaffer (Xylos Rubber), Jean H. Nesbit (U. S. Rubber Reclaiming), Allyn I. Brandt (Philadelphia Rubber Works), Robert E. Casey (Naugatuck Chemical), F. B. Traflet (Pequanoc Rubber), Irving Laurie (Laurie Rubber Reclaiming), and Gilbert K. Trimble (Midwest Rubber Reclaiming). The committee was scheduled to meet in Washington on August 15 to elect officers and to discuss important matters pertaining to current problems of the industry. Lester V. Chandler, price executive of the Rubber Price Branch of the OPA, was chairman of the meeting.

FINANCIAL NEWS

UNITED STATES RUBBER CO. REPORTS NET OF $5,852,827

The United States Rubber Co., New York City, reports a net income of $5,852,827 for the first half of 1944, after all charges, including provision for federal and foreign income taxes and renegotiation of war contracts. This equals, after provision for $4.00 in dividends on the 8% preferred stock, $1.85 a share on 1,759,092 shares of common stock. This compares with a net income of $6,912,466, or $2.44 a share on the common stock, in the first half of 1943.

Consolidated net sales, exclusive of the volume of business done for the Government on a cost plus fixed fee basis, amounted to $219,373,621 before renegotiation. Sales and net income before income taxes for the first six months of 1944 are not comparable with those reported for the same period of 1943. This year the provision for renegotiation of war contracts was included with the provision for income taxes, while in 1943 the provision was deducted from sales.

Sales and income before taxes and renegotiation on regular operations were greater than for the corresponding period of 1943. Provision for federal and foreign income taxes and renegotiation of war contracts amounted to $28,492,214.

The consolidated balance sheet as of June 30, 1944, shows current assets of $142,795,346, including cash of $22,232,709, compared with current assets of $154,260,077, including cash of $34,803,321, on December 31, 1943. Accounts and notes receivable from customers, less reserves for doubtful accounts ($2,535,921 for 1944) totaled $45,906,622 against $47,855,054 at the close of 1943. Total inventories (at lower of cost or market) were $72,715,669, compared with $69,580,780.

Current liabilities, including accounts payable of $15,905,387, aggregated $41,405,429. This compared with $16,171,233 and $45,383,031, respectively, on December 31 last. Accrued federal income and excess profits taxes and renegotiation of war contracts (less U. S. Treasury Savings notes $44,234,812 for 1944) were $10,366,685 against $15,545,714, on December 31, 1943, when U. S. Government Treasury notes totaled $32,257,548.

The company retired $2,417,000 of the 3⅝ per cent first mortgage and collateral trust bonds, series A, due July 1, 1958, reducing the outstanding amount to $29,308,000.

O'Sullivan Rubber Co.

For 1943: Net income of $276,669, after a tax deduction of $353,240, which compares with net income for 1942 of $143,478, after a tax deduction of $128,467.

GENERAL TIRE REPORTS NET PROFIT OF $1,209,560

The General Tire & Rubber Co. and subsidiary companies have reported a net profit, after taxes and other charges, of $1,209,560 for the six months ended May 31. This is equivalent to $2.02 a share on the common stock, and compares with a net profit of $962,265, or $1.70 per share, for the same period in the last fiscal year.

Net sales were $33,367,327 as compared with $25,296,563 for the first six months of 1943, an increase of 31.9%. It was the company's greatest sales volume for any six months period in its history.

The net profit before deductions were made was $4,509,560, from which $3,300,000 was taken off as provision for estimated renegotiation refund and Federal tax on income.

Firestone Tire & Rubber Co.

Six Months To April 30: Net profit of $6,626,652, after deducting depreciation, interest and $18,130,484 of domestic and foreign income and excess profit taxes, and providing an additional $2,500,000 as a reserve for contingencies. This represents a profit of $2.88 on each share, and compares with a net profit of $6,387,797, or $2.60 a common share, for the like period of last year. $2,000,000 was set as a reserve for contingencies at that time.

New Jersey Zinc Co.

Second Quarter: Net profit of $1,350,968, after provision for contingencies and reserve representing pro rata share of annual allowance for special additional compensation, which was $450,000 for the first half of 1944. This is equal to 69c a share as compared with 76c a share for the corresponding quarter of last year. Earnings for the first half of 1944 equaled $1.38 a share as against $1.53 a share last year.

Master Tire & Rubber Co.

First Half: Net income of $177,961, which is equal to $1.14 a share of common stock, compared with a net of $158,742, or $1.01 a share, for the same period last year. Sales for the period were $4,036,062, which compares with $2,836,301 for the same period of last year.

United Shoe Machinery Corp.

Year Ended Feb. 29: Net income of $7,744,426, after provisions for taxes and contingencies, which after payment of preferred dividends amounting to $387,279, is equal to $3.20 per share of common stock.

Dewey & Almy Chemical Co.

First Half: Consolidated net profit of $311,029, after $456,000 was deducted for taxes, which is compared with a consolidated net profit of $289,047, after deducting $401,000 for taxes, in the same period of 1943. This is equal to $1.03 a share as compared with 98c a share in 1943. Net sales for the first half of 1944 amounted to $5,050,038, compared with $4,103,781 for the corresponding period last year, or a gain of 22%.

Rome Cable Corporation

Year Ended March 31: Net profit of $452,976, which is equal to $2.38 a common share, and compares with $348,916, or $1.83 a share, for the preceding fiscal year. For the three months ending June 30, a net income of $125,970, or 66c a share, as compared with $125,914 for the same period last year, was shown. Provision for Federal taxes was $618,100 as against $366,160 in 1943.

General Cable Corporation

First Half: Net income of $1,125,058, after $5,620,000 provision for taxes on Federal income, as compared with a net of $1,041,888, after $4,670,000 tax provision, reported for the corresponding period last year.

St. Joseph Lead Co.

First Half: Net profit of $2,225,287, which is equal to $1.12 each on 1,975,456 shares, and which compares with a net profit of $2,697,084, or $1.38 on each of 1,955,680 shares for the corresponding period last year.

Synthetic Rubber Reductions

Price reductions have been announced recently by three manufacturers of synthetic rubber. E. I. du Pont de Nemours & Co. has announced that the price of Neoprene CG, effective July 25, is 50c per pound and the price of Neoprene Latex Types 571, 571 Concentrated, 572 and 60 is 36c per pound in tank cars. Perbunan 26, effective July 1, is 48c per pound, according to Stanco Distributors, Inc. Hycar Chemical Co. has announced that, effective July 1, the price of Hycar OR-15 is 50c per pound and Hycar OR-25 and OS-10, 45c per pound.

Shepard Heads American SCI

Dr. Norman A. Shepard, chemical director of the American Cyanamid Co., was recently elected chairman of the American Section of the Society of Chemical Industry to serve until July, 1945. Frank J. Curtis, vice-president of the Monsanto Chemical Co., was selected as vice-chairman. The following were elected as members of the Executive Committee: P. K. Frolich, F. D. Snell, W. B. Wiegand and E. C. Williams.

Vaco "Seawise" Life Suit

Due to the foresight of the United States Coast Guard, Bureau of Merchant Marine Inspection, in adopting life suits and making them mandatory for ocean

and coastal vessels of 1000 gross tons and over, thousands of lives are being saved in the American Merchant Marine. One of the companies manufacturing these life suits is the Vaco Co., 15 Moore St., New York 4, N. Y. The body of the suit manufactured by Vaco, known as the Vaco "Seawise" Life Suit, is made of synthetic rubber and resists the action of flame and fire. The material is, of course, waterproof throughout. The suit weighs 11½ pounds and has weighted feet and finger-formed gloves. It is made in one size to fit all men and covers the entire body, except the face. It offers maximum comfort and protection against exposure to cold air and water and features a strap hoist that allows the wearer to be lifted from the water, even though he may be covered with a thick oil, without strain or cut to the body. A trained man can get into one of these suits, all strapped up, in approximately one minute.

Textile Roll Covering

A new type of textile roll covering made of a special synthetic rubber and cork composition is being marketed by the Armstrong Cork Co., Lancaster, Penna. Known as Accotex NC-727, this new type of cot has been mill-tested and performance reports indicate that it resists "slicking" and minimizes "eye-browing." It is non-sweating, non-thermoplastic, resists flattening and is unaffected by oil, water, dyes or textile solvents. It has no seams and the inside is ready glued to aid quick application to rolls. This new cot can be rebuffed 3 or 4 times for extended use.

Coming Events

Sept. 11-15. 108th Meeting, American Chemical Society, New York, N. Y.

Oct. 3-5. 33rd National Safety Congress & Exposition, Hotels Sherman, Morrison and LaSalle, Chicago, Ill.

Oct. 6. New York Rubber Group, Building Trades Club, New York.

Nov. 15-19. Third National Chemical Exposition, Coliseum, Chicago, Ill.

New Goodyear Tire Plant

Approval for a new tire plant to be operated by the Goodyear Tire & Rubber Co. in Topeka, Kansas, has been given by the Office of the Rubber Director, and first construction contracts have already been awarded. The new factory, which is a Defense Plant Corporation unit, will produce tires of large dimensions for mechanized military equipment. It is expected to be completed and in operation about January 1, 1945, and will employ about 400 people when full production is attained. This new tire unit is one of the five plants authorized last year in the $75,000,000 rubber industry expansion program. B. F. Goodrich Co. is rapidly completing a plant at Miami, Okla., General Tire & Rubber Co. is finishing a plant at Waco, Texas, U. S. Rubber Co. has a plant under construction, also in Texas, and the Firestone Tire & Rubber Co. was allotted a new plant, to be built at Des Moines, Iowa.

Changes at DeVilbiss

Several major changes were recently announced in the executive department of the DeVilbiss Co., Toledo, Ohio. Howard P. DeVilbiss, former vice-president of the company, has been elected president and general manager, and Allen D. Gutchess, former president, has been named chairman of the board and active senior executive. Coincident with these changes is the retirement of Frank A. Bailey, former vice-president and general manager, due to ill health. Roy A. Guyer continues as vice-president in charge of sales and now becomes a director of the concern. Don J. Peeps has been appointed acting chief engineer.

Improved Transmission Belt

The Goodyear Tire & Rubber Co., Akron, has announced the development of a new transmission belt especially adapted to severe farm operations in addition to hammermills. This new belt, known as the "Hammermill Special," is made with synthetic rubber and is built in an endless method by a "round and round" process, eliminating any vulcanized splices. The belt is made with a square edge and is being produced in widths from 5 to 7 inches and in lengths from 40 to 75 feet.

Galco Leak Preventative

Galco, a Thiokol latex coating that is said to prevent leaks in all types of fuel tanks and that could be used as a household plumbing sealant, has been developed by the Consolidated Vultee Aircraft Corp., San Diego, Calif. Galco is highly resistant to heat and most common solvents. It can be applied with a brush and will withstand temperatures from —70° to 212° F. Aluminum surfaces can be made air-tight and waterproof even under pressures. Postwar applications of Galco, which is to be manufactured commercially by the Presstite Engineering Co., St. Louis, Mo., are sealing boat hulls and floats, and waterproofing fabrics.

Form Hardesty Chemical Co.

The W. C. Hardesty Co., New York, and Amecco Chemicals, Inc., Rochester, N. Y., have joined in the organization of the Hardesty Chemical Co. for the production of sebacic acid, capryl alcohol, dibutyl sebacate and related compounds. Each company will, however, continue in the production and distribution operations of their respective fields.

Non-Skid Airplane Coating

A new non-skid airplane walkway coating made of Thiokol and ground cork for use in Allied war planes has been developed by the Minnesota Mining & Manufacturing Co., St. Paul, Minn. This new surface material is less than one-fifth the weight of rubber matting, adheres to metal, plywood and painted surfaces, remains flexible at temperatures ranging from —20° F. to 160° F. and is resistant to fire, gasoline, aromatic fuel, salt water, oils, hydraulic fluid and oxidation. It is applied at room temperature with an open nozzle spray gun (see ac-

companying illustration) and only one application is necessary to build up a Thiokol-cork coating of sufficient thickness. It dries so quickly that the panels are ready for actual use within 12 to 14 hours.

OBITUARIES

William B. Miller

William Baldwin Miller, chairman of the board and founder of the Norwalk Tire & Rubber Co., Norwalk, Conn., died on July 27 at the Flower-Fifth Avenue Hospital in New York City. He was 76 years of age.

A native of Mt. Vernon, N. Y., Mr. Miller as a young man entered the employ of the former Revere Rubber Co., Chelsea, Mass., and rose to the position of assistant sales manager until he left to become secretary and general sales manager of the old Diamond Rubber Co. in Akron.

At the time of the merger of the Diamond Rubber Co. with the B. F. Goodrich Co. in 1912, he joined the Goodrich organization as second vice-president and assistant sales manager. In 1914 he founded the Norwalk Tire and Rubber Co. and acted as president until 1929, when he resigned. He remained a director of the concern until his death.

Well known as a breeder of thoroughbred horses, Mr. Miller was president and owner of the Greenwich Stud in Lexington, Ky. He was a member of the Union League Club, New York, the Greenwich Country Club, Conn., and the Turf and Field Club.

Funeral services were held at his home in Greenwich, Conn., and interment was in Woodlawn Cemetery, New York City. A widow and three daughters survive.

Shelby M. Jett

Shelby M. Jett, secretary, head of the legal department and a member of the board of directors of the B. F. Goodrich Co., Akron, since 1927, died suddenly on August 9, while aboard a commercial transport plane just before arriving at the Cleveland Airport. He was 55 years of age.

Born on a farm near Richmond, Ky., Mr. Jett graduated from Hampden-Sydney College in 1911 and then attended the University of Virginia where he received his law degree in 1914. Thereafter he practiced law in small towns in the south until November, 1917, when he joined Goodrich. Six months later he moved into the newly-formed legal department, of which he has been head since 1927.

Mr. Jett's avocation was hunting and he had shot game throughout Canada, the Rocky Mountains, and Mexico. He had also traveled extensively in Europe.

Funeral services were held on August 12 at Akron and burial followed on August 13 at Richmond, Ky. A widow, two daughters and a son survive.

William A. Hart

William A. Hart, secretary-treasurer of the Midwest Rubber Reclaiming Co., died on July 28, in East St. Louis, Ill., as a result of a heart ailment. He was 64 years of age.

Born in Hillgrove, Darke County, Ohio, Mr. Hart was graduated from the Union City (Ohio) High School and then studied accounting under an Ohio accounting firm and law under the tutorship of a law firm in Akron.

In 1917 he joined the accounting department of the Goodyear Tire & Rubber Co., Akron, where he remained until 1924 when he became secretary and treasurer of the Akron Rubber Reclaiming Co. When Midwest absorbed the Akron Rubber Reclaiming Co. in 1928, he became secretary-treasurer of Midwest Rubber Reclaiming, a position he held until his death.

Funeral services were held on July 31, at East St. Louis, Ill., A widow, three sons and three daughters survive.

Edgar H. Bristol

Edgar H. Bristol, president and founder of the Foxboro Co., Foxboro, Mass., died unexpectedly of a heart attack on July 24, at his summer home at Falmouth Heights, Mass. Born in Naugatuck, Conn., in 1871, Mr. Bristol, after completing his high school education became a tool-maker and subsequently production manager of the instrument company of which his father was president. He withdrew in 1908 and with his brother, Bennet B. Bristol, organized the Industrial Instrument Co., which in 1914 became the Foxboro Co. Mr. Bristol maintained an active participation in the company's affairs and served as president throughout its history. He had more than 40 patents to his credit, including the helical spring. A widow, a son, and four daughters survive.

Dr. Nicholas L. Kalman

Dr. Nicholas L. Kalman, at one time engaged in research chemistry with the Ridbo Laboratories, Paterson, N. J., died at Mount Sinai Hospital, New York, on July 26, after a long illness. Born in Hungary, where he graduated from the University of Budapest, he came to the United States in 1914 and became a manufacturing chemist in Mendham, N. J. Subsequently he engaged in research chemistry with Little & Co., Cambridge, Mass., and later with Ridbo. A widow survives.

Tires from Kok-Saghyz

Rubber from kok-saghyz cultivated in the United States as part of the government's experimental program with rubber-bearing plants will shortly be converted into tires, probably for military use. The kok-saghyz seeds were furnished to the U. S. Department of Agriculture by the Soviet Union. In the accompanying photograph, E. B. Newton, left, and Dr. H. L. Trumbull, right, of the B. F. Goodrich Co., Akron, are examining kok-sakhyz rubber, which in the opinion of Dr. Trumbull compares in quality to the best prewar Far Eastern plantation grades.

An elastic bandage made with Vinyon is now being made for commercial use, according to an announcement made by the American Viscose Corp. The bandage is being manufactured by Medical Fabrics, Inc., Paterson, N. J., and Becton Dickinson & Co., Rutherford, N. J. It was reported that the bandage provides maintained elastic compression.

U. S. Rubber will continue its sponsorship through the summer months of the Sunday afternoon radio concerts of the Philharmonic Symphony Society under the baton of Artur Rodzinski.

General Tire & Rubber, Akron, will occupy the former Ball Bros. plant at Huntington, W. Va. The plant will be used for the assembly of certain war equipment.

The Brill Equipment Co., dealers in reconditioned machinery, has moved to new quarters at 225 West 34th St., New York 1, N. Y.

Arnold L. Scheuer

Arnold L. Scheuer, retired banker and one time president of the Kelly-Springfield Tire Co., Cumberland, Md., died on August 8, at his New York home after an illness of three months. Born in Cincinnati sixty-six years ago, Mr. Scheuer was president of A. L. Scheuer & Co., private bankers, until his retirement in 1934. A widow, two sons and a brother survive.

CANADIAN NEWS

In a general review of current research activ[illegible] Dominion Experimental Farms, [illegible] G. Gardiner, Minister of Agriculture, said in the Canadian House of Commons on July 19 that 10 acres of rubber plants were on the Central Experimental Farm at Ottawa while there were 600 acres in Peterborough County in Ontario. There also are plots on practically all experimental farms and some had been successful and some not. These plots included dandelions and other rubber-producing plants. There were six acres of dandelions at Ottawa.

One of Canada's most important war plants—the synthetic rubber plant at Sarnia, Ontario—is the one exception to the uncertain future of war plants. Hon. C. D. Howe, Minister of Munitions and Supply, has made it clear that the government has no intention of disposing of the Polymer Corporation plant although offers have been made by private enterprises.

Munitions plants come under the government program for the disposal of all war assets. This will mean that before any disposition can be made of a plant the Federal Cabinet will have to give approval. In a number of instances plants which the government has financed are extension of pre-war industries and in many of these cases the private company has an option to purchase the new plant and equipment if it desires.

The 1,100 Dominion Rubber Company tire factory workers who went on strike on August 2 were back at their jobs on Tuesday, August 8, company and union officials stated. The strike ended officially at 11 p.m., August 7, when employees on that shift returned to work. The decision to return to work was reached at a meeting of the strikers held Sunday morning, August 6.

Basis of settlement, according to James Hutcheon of the Ontario Department of Labor, who conducted separate conferences with the management and the union, was an adjustment in standard rates in the press room agreed upon by the company.

Mr. Hutcheon stated that in the curing, shaping and strip paint and bag test departments, the former efficiency of 102 per cent had dropped to 92 per cent either through a change in materials or the type of tires being manufactured. As a result of the drop in efficiency, the hourly rate earned by employees ranged from 88 to 96 cents.

The company adjusted the standards to the point where the same effort would raise the employees' efficiency to 101 per cent which in turn raised the hourly rate of pay to 96.8 cents.

In a special report issued on July 14, the Interim Board of Directors of the Chemical Institute of Canada, the recently organized group which has embraced all of the Canadian chemical groups, revealed that the board has met twice since the Canadian Chemical Conference in Toronto and has elected L. E. Westman chairman, Dr. P. E. Gagnon, honorary treasurer, and Dr. R. R. McLaughlin, honorary secretary to the Board. A number of special directors have also been named.

It was also revealed that Dr. R. V. V. Nicholls, Director of Information, is making plans to organize subject divisions, on both a local and national scale, and hopes to be able to announce the establishment of a news letter or journal for the membership as soon as arrangements can be made. A committee is also being established to draft the constitution and by-laws of the recently-organized Institute.

Plant facilities rather than rubber supplies now are the limiting factor in the manufacture of tires, it is learned. With the government-owned Polymer Corporation synthetic rubber plant at Sarnia, Ontario, operating at near capacity, supplies are being produced which have resulted in a marked easing of the rubber situation.

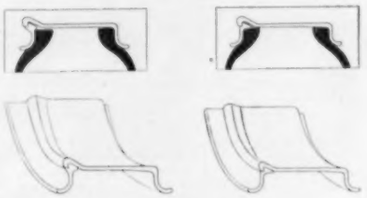
Restrictions on the sales of tires for civilian use were originally introduced as a result of the rubber shortage. Now that the situation has improved manufacturing plants are operating at capacity, but they are engaged largely in the production of tires for military vehicles and other war vehicles with only a narrow margin devoted to civilian passenger tire output.

With the industrial expansion stage of the war passed it is considered unlikely that there will be plant expansion to allow manufacture of more civilian tires and users are not likely to get any major relief until the production of tires for war purposes slackens.

C. S. Pope, associated with Gutta Percha & Rubber, Ltd., Toronto, has been appointed to the position of manager of the export department of that company, succeeding Leonard L. McMurray, who has retired on pension after 52 years of service with the company. Mr. Pope, who has been assistant manager of the export department for 10 years, started as a clerk with Gutta Percha in 1919 after five years spent overseas in the last war. In the past 10 years he has travelled extensively in the interests of the company.

New Wide Base Rim

A new wide base rim for truck tires, combining all the features of the present standard rim base with a new side ring that increases rim width has recently been developed by the Goodyear Tire & Rubber Co. According to Goodyear en-



gineers, the rubber industry recently determined that the width of the rim should be approximately 70% of the sectional diameter of the tire if maximum performance is to be obtained. They claim that a lesser rim width pinches the tire and causes excessive flex in the sidewalls. Also that tires mounted on the wide rims do not generate as much heat in the shoulder of the tire as do tires mounted on narrow rims and that the average amount of deflection under load and in motion is reduced by 12½% when the ratio of the rim to that of the sectional diameter is increased from 60 to 70%. They go on to state that the wider rim also adds to the stability of the tires, reducing sway and giving a more positive steering response. As shown in the accompanying illustration, the new width is obtained through the use of a new type side ring which generally adds half an inch or more to the rim width. An additional feature of the new type rim is the tapered "seat" under both beads. This centers the beads and decreases chafing and bead failure.

DuPont Denies Cartel Charge

An answer to the civil suit brought on January 6 by the Department of Justice was filed in New York City on July 26 by E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. In its reply, DuPont denied violation of the anti-trust laws in its relations with Imperial Chemical Industries, Ltd., of England, and other companies abroad, and claimed that these relationships benefited the American people by promoting scientific advance in chemical production while at the same time reducing prices to the public. Dismissal of the suit was requested.

Taylor Instrument Companies, Rochester, N. Y., has resumed production of process timing mechanisms for Fulscope temperature or pressure controllers.

A new, light and versatile poncho, made of nylon fabric, coated with synthetic resin, has been developed by the Office of the Quartermaster General. The nylon poncho weighs about 30 ounces and it will soon be issued to troops in tropical combat areas.

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NEW EQUIPMENT

Specimen Table for Taber Abraser

A new type specimen table for the Taber Abraser, product of the Taber Instrument Corp., North Tonawanda, N. Y., that permits testing of material specimens in a moist or wet condition, has been announced

by that company. The specimen table holds a sufficient amount of water to cover the specimen when performing "wet tests."

The wearing action is performed by dual Calibrase wheels bearing against the specimen under constant pressure, revolving in opposite directions, one sliding radially toward the outside, the other sliding toward the inside of the wear path. Each wheel revolving at a steady constant speed, through contact with the specimen, exerts a combined abrasive, compressive and twisting action twice in each revolution of the specimen holder. Because the specimen holder travels a complete 360 degree circle, the wear due to differences of grain or weave is fully revealed. A standardized load adjustment is provided for varying the pressure of the Calibrase wheels against the specimen so the abraser will test both delicate and tough materials with equal precision.

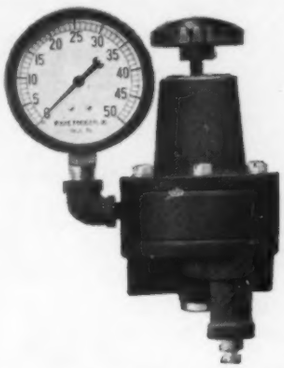
The results of tests are reported either numerically as the number of "wear cycles" to produce a given amount of wear, or as "loss in weight" when weighed on a precision laboratory balance.

Moore Nullmatic Pressure Regulator

A new regulator, called the Moore Nullmatic Pressure Regulator, which is designed to hold air pressures constant, regardless of changes in flow as well as variations in supply pressure, has been developed by the Moore Products Co., H and Lycoming Streets, Philadelphia 24, Penna. Constant regulated values over long periods of time are said to be also functionally inherent in the new design.

The regulator operates on the pneumatic "null" balance principle and may better be described as a pressure controller, since the main air valve is operated by a detecting nozzle. This nozzle operates with a constant differential pressure to hold the manual loading spring at essentially the same position, regardless of variations in flow or in supply pressure.

An automatic bleed is provided, to operate when a reduced regulated pressure is required. The automatic bleed also serves to permit reverse flow when the regulator is used as a limit control on industrial instrument applications. A separate safety release is also incorporated in the design, to operate a few pounds above the regulated value. All materials in contact with the air are corrosion-resistant. The special neoprene diaphragms used are suitable for continuous operation at



temperatures up to 225° F. A manual adjusting knob and a fine thread facilitate accurate setting. Ease of operation is obtained through a ball thrust bearing.

These regulators are available in three standard ranges: 0—15 p.s.i.; 0—30 p.s.i.; 10—50 p.s.i.; and are suitable for use on supply pressures up to 150 p.s.i. Provision is made for panel or pipe mounting as required. With 100 p.s.i. supply pressure and a 25 p.s.i. regulated pressure, the maximum capacity is approximately 10 s.c.f.m.

Release of an **electronic circular chart electric controller** for manufacture of either war or civilian goods has been announced by the Brown Instrument Co., Philadelphia. Each model released will have several new features, including a control point index which is in red and of the same general shape as the black temperature pointer.

Hapman Conveyors, Inc., 308 Boulevard Building, Detroit, has introduced a complete line of **self-cleaning coolant tanks,** with or without filtering. Two additional new products featured by the company include **self-cleaning sludge tanks** and **central sludge collecting systems.**

A new automatic oil circulating and heating unit, known as **Model S-12 Oil Heating Unit,** has been designed by the Youngstown Miller Co., Sandusky, Ohio, to provide heat transfer oil to machines which require elevated temperatures. A typical model or size has 12.9 kw of electric heaters applied externally to the heating portion of the tanks and capacity for 12 gallons of oil.

Several important advantages are claimed for the new batch type **shredding and mixing** machine recently introduced by the Northmaster Division of Struthers Wells Corp., Titusville, Penna. The machine features an entirely different form of mixing element and is available in sizes up to 4,000 gallons working capacity to meet any requirement.

● **Among the great discoveries of recent years is a system for using plain, ordinary water to do a quick, thorough job of quenching fires due to oil or other flammable liquids—*"Automatic" FIRE-FOG.***

By a specially designed FIRE-FOG nozzle, drops of water are "broken" into droplets—countless millions of them! The result is a heavy mist. When fire breaks out this mist, propelled at required velocity and pre-directed at vulnerable areas, finds its mark instantly. The fire is enveloped; flames are beaten down; the blaze cools; oxygen is excluded; the fire suffocates and is quenched. The entire operation is automatic, and so quick and effective that only seconds elapse before the fire is "dead."

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TRENTON, N. J.—General Supply & Chemical Co.

Precision Flexing Fixture

A new flexing fixture for determining the flexibility factor of rubber products, synthetic rubber and flexible plastics at low temperature, has been introduced by the Precision Scientific Co., 1750 North Springfield Ave., Chicago 47, Ill. The method used is patterned after the freeze test originated by the Thiokol Corporation and has been incorporated into a number of recent aeronautical material standards specifications covering synthetic rubber.

The instrument and its operation, as used in the Thiokol laboratory, can best be understood from the accompanying photograph. The principle of the test is based on bending the samples between two parallel plates. By control of the minimum distance between the plates at the time of maximum bend, the sample can be given most any desired radius of bend. By turning the crank the samples are flexed. Whether the crank is turned a half revolution, a whole revolution, or several revolutions, depends on the prescribed conditions set up for the test.

View of the new flexing fixture

The sample, usually in the form of a strip 4 x 0.25 x .60 inch, is mounted between plates 2½ inches apart to form a loop. The plates should be sufficiently wide (i.e., 2 to 2½ inches) so that the bend in the test piece doesn't protrude beyond the edge when the plates are brought together. When the samples have been properly conditioned at the low temperature, the samples are flexed by simply turning the crank. The apparatus is very simple and exceedingly flexible. It allows numerous adjustments as to the amount of bend given the sample and also the number of bends.

To permit suspension of the apparatus in a cold box, the flexing mechanism is mounted on a heavy wooden base 11½ inches long, 8 inches wide, three inches thick with overhanging flange and edges of base bevelled to fit into an opening of proper size cut into the cold box. Such an installation is ideal because it permits the entire unit to be removed for the insertion of additional test specimens. If desired, the entire unit can be set into a cold box.

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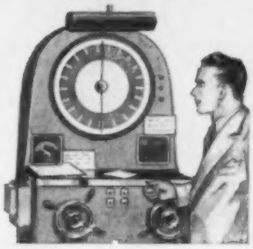

Use Rayco Flock to contribute the desired qualities of strength increase and abrasion resistance to compounds of crude, synthetic or reclaim stocks. We make numerous varieties and work closely with you to determine the type best suited to each of your various needs. Request samples and prices.

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THE Schuster
MAGNETIC CALENDER GAUGE
SAVES THAT MATERIAL

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Better investigate the Schuster Magnetic Calender Gauge at once, with or without automatic control. Every installation has to be engineered to the job . . . Please *give us time to do it right.*

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New Tag Moisture Meter

The development of a new dielectric type moisture meter, which completes its line of rapid electrical moisture testers, has been announced by the C. J. Tagliabue Manufacturing Co., Brooklyn, N. Y. The new

instrument is designed for measuring the moisture content of powders, or graular materials such as dehydrated foods, soaps, flour, plastic molding materials, etc., for which their other electrical conductance instruments are not suitable.

It is reported that the new Tag Dielectric Type Moisture Meter is designed for the precise measurement of the dielectric property of a test sample. It is electrically simple but extremely sensitive. This sensitivity is not only the result of a unique electronic method but also advantage is taken of the fact that the dielectric constant of water is about 80 while that of common substances is less than 10. Thus, a slight change in moisture content has a marked effect (in nearly all cases) on the dielectric constant of a substance. The manufacturers state that, by using this meter, moisture determinations can be made in less than two minutes.

Incorporating a fan cooling system which permits a pronounced reduction in size of the unit required for a given h.p. output, the **Speedaire Worm Gear Reduction Unit** has been announced by the Cleveland Worm and Gear Co., Cleveland. The basis of the cooling system is a new type of double wall construction which provides an air passage completely enveloping the oil reservoir in which the gear operates.

The **Metco Type 3E Metallizing Gun,** specially engineered for the high speed production spraying of low melting point metals, has been introduced by the Metallizing Engineering Co., Inc., Long Island City, N. Y. The new gun is reported to exhibit spraying speeds which exceed by far any yet attained with various metals.

The **Ipco Safety Parts Lifter,** a safety and production tool designed to prevent finger and hand injuries and speed up jobs, has been announced by the Industrial Products Co., Philadelphia 33, Penna. The new device may be used for lifting, feeding and positioning sheets in stamping machines and diepresses, without inserting the hands or fingers within danger zones.

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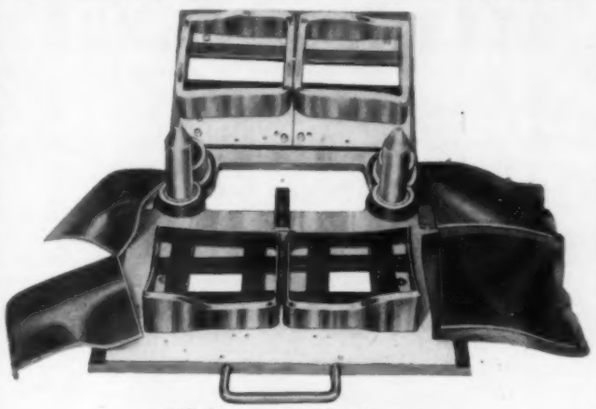

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GRINDING MILL
For Producing
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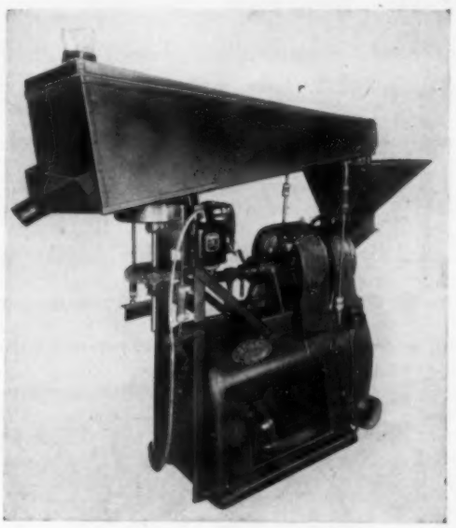
Ground Rubber Scrap is being used to advantage in Molded Goods of all types.



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Originators of the Capitol Process Liner Treatment

REVIEWS

BOOKS

Symposium on the Applications of Synthetic Rubbers. Published by the American Society for Testing Materials, 260 So. Broad St., Philadelphia 2, Penna. 6 x 9 in. 140 pp. $1.50 (paper binding), $1.75 (cloth binding).

The papers and discussions appearing in this volume were presented at Cincinnati, Ohio, on March 2, 1944, during the Spring Meeting of the A.S.T.M. as a special symposium. The aim of the symposium was to present an authoritative compendium of present knowledge on the subject of synthetic rubber with the full realization that such a summary cannot be complete at this time and might be of somewhat limited permanent value because of the rapid changes taking place. Nevertheless, this small reference volume will prove helpful to the users of synthetic rubber products in aiding them to select intelligently the types of material best suited to their needs and then to use those products under conditions which will assure satisfactory service.

The volume includes papers on the origin and development of synthetic rubbers by Fisher (U. S. Industrial Alcohol), physical testing by Cooper (Firestone), physical properties by Ball and Maassen (Vanderbilt), specifications by DeFrance (Goodyear), and an interesting evaluation of processing characteristics and the use of synthetic rubbers in the manufacture of extruded products by Juve (Goodrich). There are also several papers covering specific applications, including tires and tubes by Torrance (Du Pont), belting and hose by White (Manhattan Rubber), molded products by Sanger (General Tire), cellular rubber by the late Louis P. Gould, hard rubber products by W. H. Juve, wire and cable by Schatzel (General Cable), footwear by Glover (U. S. Rubber), and adhesives by Wehmer (Minnesota Mining).

Prior to presentation at Cincinnati, all of the papers were reviewed by a special Symposium Committee, headed by Arthur W. Carpenter (Goodrich), and before publication each one was again studied and revised by the authors. This procedure insured the presentation of the material in clear and concise fashion and enabled the vast amount of information contained in the present volume. Every technologist concerned with the production and use of synthetic rubbers and all those who are concerned with this field, even in its non-technical phases, will find this book of definite interest.

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Rubber After the War. By K. E. Knorr. Published by the Food Research Institute, Stanford University, Stanford University, Calif. 6 x 9 in. 46 pp. 25c per copy.

This is the fourth in a series of war-peace pamphlets being published by the Food Research Institute of Stanford University and is actually a revision of the series of articles under the same title which ran in the *India Rubber World* from July through October, 1943. Based upon a careful study made by the author, who is an acting associate economist at the Food Research Institute, it represents a brief yet detailed analysis of the potentialities of rubber in the postwar period.

After giving some background facts and outlining the postwar rubber problem in general, the booklet discusses specific angles, including prospective postwar consumption and supplies, production costs of synthetic rubber, future price competition of natural and synthetic rubber, protection of the synthetic rubber industry, military self-sufficiency, monopolistic control of Malaysian rubber, and the Latin-American situation.

In his conclusion, the author states that in the postwar world the United States can obtain a secure rubber supply without resorting to costly protection of a big war-built industry by making provision for a permanent emergency stockpile of crude rubber, regularly amounting to perhaps one year's average consumption and subject to expansion in the event of serious national crisis.

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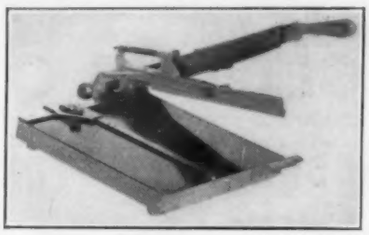

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Patented spring and hinge suspension of knife assures long cutting life.

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A LONG ESTABLISHED AND PROVEN PRODUCT

Plastics Stock Molds. Compiled and published by Modern Plastics Magazine, 122 East 42nd St., New York 17, N. Y. 8 x 10 in. 182 pp. $5.00.

Illustrations and brief descriptions of nearly 1,600 stock plastic molds, now in the possession of scores of firms throughout the country, as well as nearly 200 standardized extruded cross-sections and standard laminated sheets, rods and tubes, are contained in this catalog. The stock molds, which save countless thousands of man-hours in the manufacture of plastic parts, are classified according to the type of product molded in them, there being 22 classifications in all, ranging from flashlights to smoking accessories. Six separate indices are included to enable the user to locate any type of stock mold and to secure the manufacturer's name and address. Since stock molds have always represented an important segment of plastics production, this catalog should prove of value to every user of molded plastics.

•

Packaging Catalog: 1944. Published by the Packaging Catalog Corp., 122 East 42nd St., New York, N. Y. 8¼ x 11¼ in. 750 pp. $2.50.

The latest edition of this "encyclopedia of packaging" is keyed to the theme of reconversion, the entire first section being devoted to this subject in all of its ramifications. Noteworthy is an article by a WPB official outlining a time-table for the reconversion of various materials to peace-time uses. Despite war-time difficulties, enough new material has been gathered by the editors to make at least 60 per cent of the current issue completely different from anything that has appeared before. All of the war-time progress in packaging, including the many new uses of paper, the new protective wraps and coatings, and the new shipping packages and devices, is reviewed. In addition, the index section of the catalog has been completely revised and brought up-to-date, including the buyers' directory, the directory of trade names, and the list of manufacturers and addresses.

BOOKLETS, CATALOGS, Etc.

Planning Postwar Products and Markets. Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York 10, N. Y. 8½ x 11 in. 61 pp.

What forty-seven companies, now wholly or partially engaged in war work, are doing to achieve the result posed by the questions "what to make" and "when and how to sell it" in the postwar period, is the subject of this booklet. Although manufacturers are concerned with new products in this forthcoming period, the present investigation shows that in the majority of cases major attention is being devoted to determining which present products have a good immediate potential market, which can be distributed through regular marketing channels, and which can be put into production quickly without large capital expenditures. An extensive check list of questions to be asked at each step in production and marketing research is included as an appendix to the survey.

•

Continex SRF. (Report 44-3). Witco Chemical Co., 6200 West 51st St., Chicago 38, Ill. 8½ x 11 in. 20 pp.

Continex SRF, a new carbon black of the semi-reinforcing furnace type, is now in plant production and this laboratory report has been prepared to illustrate the properties of compounds of natural rubber and GR-S using the new black. Data is presented showing how Continex SRF compares with a competitive SRF grade black in natural rubber at loadings from 0 to 120 parts of black per 100 parts elastomer. A comparison between these blacks at various loadings in GR-S is also given. A comparison is also given of the physical properties of Continex SRF with those of seven other standard blacks in GR-S and natural rubber. Electron micrographs of three blacks are reproduced to show the relationship of particle size of various blacks.

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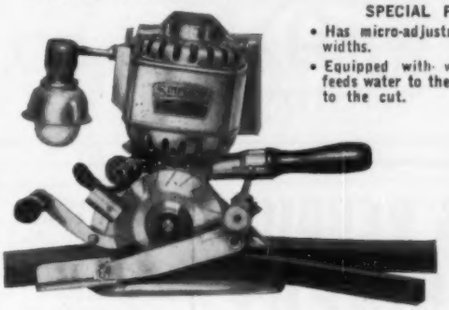

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REVIEWS (CONT'D)

GR-S, an Elastically Inverted Polymer. By H. A. Braendle and W. B. Wiegand. Issued by Columbian Carbon Co. (Binney & Smith Co., Distributors), 41 East 42nd St., New York, N. Y. 5½ x 7¾ in. 14 pp.

Issued as Volume 5, No. 2, in the "Columbian Colloidal Carbons" series, this booklet is a reprint of the talk recently given by the authors before the American Institute of Physics, which originally appeared in the April, 1944, issue of the *Journal of Applied Physics* and later in the May, 1944, issue of *India Rubber World*. The booklet points out the elastically inverted behavior of GR-S and assesses its implications. The results of a study of rubber stretched to near rupture are given and the conclusion given that the hysteresis of GR-S at low elongations must be reduced so that tires will run cooler, but at the same time its hysteresis at higher elongations must be increased so that it will relax under higher amplitude flexures and so prevent premature flex cut failure.

•

Blueprint for Industry. (Part III). Industrial Oven Engineering Co., 11621 Detroit Ave., Cleveland 2, Ohio. 8½ x 11 in. 4 pp.

This is the first complete catalog description of the constant-speed, constant-tension windup machine for wire, cable, textiles, tapes, coated fabrics, etc., developed and manufactured by the Industrial Oven Engineering Co. What the machine is and how it works is covered, and engineering features and specifications are outlined. A dimension drawing of the machine is shown. The windup machine finds application in the rubber field in tire fabric processing, cord impregnating and in tubing, hose and spreader take-up among other uses.

•

Velon—The Miracle Material for the World of Tomorrow. Firestone Industrial Products Co., Akron, Ohio. 8½ x 11 in. 12 pp.

A brief description of Velon, the plastic material developed by Firestone, and some of its present and potential applications, are given in this booklet. Velon for seats, Velon braids and Velon screens are among the subjects discussed. The material is said to have high abrasion resistance, the ability to be extruded into tubes or strips or drawn into threads and the finest of filaments. It is glossy, may be had in any color, and can be woven into multi-colored designs.

•

The ABC of Luminescence. New Jersey Zinc Co., 160 Front St., New York 7, N. Y. 8½ x 11 in. 24 pp.

A clear picture of luminescence is contained in this booklet through the discussion in simple language of the characteristics, properties, limitations and applications of the inorganic luminescent pigments, as well as the terms applicable to the industry. A number of simple tables and charts are included to illustrate some of these terms, such as "the dark-adapted eye" and the "decay of afterglow." The booklet is attractively printed in two colors.

•

Into a Second Century. Procter & Gamble Co., Cincinnati, Ohio. 5½ x 8½ in. 50 pp.

This is the record of Procter & Gamble's growth from a small soap-and-candle factory to one of the major industrial corporations of the United States. It is a typically American story which reflects the advances and changes in all business during the past one hundred years and its message is particularly timely in view of the current tremendous contribution made by American business to the war effort.

•

Climco Liners and Linerette. Cleveland Liner & Mfg. Co., 5508 Maurice Ave., Cleveland, Ohio. 8½ x 11 in. 8 pp.

This booklet contains a detailed account of processed liners and paper used for handling uncured rubber stocks. In addition to describing the nature and benefits of these products, the booklet also contains valuable suggestions for using them most efficiently. The manufacture of Climco Processed Liners is also outlined, with photographs being liberally used to depict specific operations.

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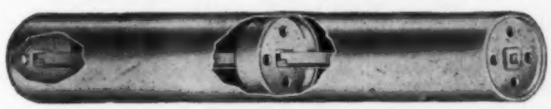

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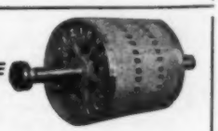

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WRITE FOR BULLETIN 302

STEARNS MAGNETIC MFG. CO.
540 S. 28th St. Milwaukee 4, Wis.

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, AUG. 14, 1944

Crude Rubber

REPRESENTATIVES of the United States, England and the Netherlands have held their first series of meetings in London to "explore" postwar problems of crude and synthetic rubber. As predicted, it was agreed to launch an extensive study of the problem, with emphasis upon potential world-wide consumption of rubber of all types in the postwar period as well as total production facilities. The results of the study will serve as the basis for further discussion between the three powers which will probably lead eventually to an international agreement of some kind. Several American authorities have already gone on record urging continuation of some kind of rubber control at least for a few years after the cessation of hostilities.

The latest Progress Report (No. 6) issued by the Office of the Rubber Director repeats the assertion that crude rubber imports from Latin America have been "disappointing" and indicates that despite the new arrangements for production and shipment entered into between the Rubber Development Corp. and various Latin American countries, there is nothing to imply that this situation will be any better in the near future. The report also points out that the cryptostegia experiment in Haiti was a gross failure and has been completely abandoned.

The question of guayule was also discussed in the report. Although only 600 tons will be harvested by June, 1945, the Rubber Director urges that the Guayule Rubber Project be continued since it would be poor policy to discontinue any rubber cultivation program until imports of crude rubber are satisfactory in all respects. The fate of the guayule program is, of course, dependent on Congressional appropriations.

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21¾	38⅞
Thin Brown Crepe, 1X	21¾	38⅞
Thick Remilled Blankets, #1	21¾	38⅞
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21¼	38⅝
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Crude	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12¾	26⅛
Upriver Coarse, Washed & Dried	20¼	37¾
Caucho Ball, Crude	11¾	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17½	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots	27¾	45¼
Heat-Concentrated, Carload Drums	29½	47

C, for Civilian Use; N-C, for Non-Civilian Use.

Scrap Rubber

Although the scrap rubber supply continues plentiful, successful grading and sorting of crude and synthetic stocks continues to be the primary difficulty of the trade. The Scrap Rubber Institute of the National Association of Waste Material Dealers is still working on the problem and hopes to come up with a satisfactory solution in the near future. In the meantime it is reported that identifications are becoming more easily recognized, such as the red circular patch and the letter "S" on the synthetic tires and the yellow band on the synthetic tubes. Various lots of synthetic scrap carefully earmarked as to grade have been offered by several government agencies recently and brought fair prices. The number of scrap sales listed by Army and Navy agencies is also increasing and tonnages offered on some of these sales are rising. The percentage of natural rubber in current scrap tire offerings, however, is still very high, although the amount of synthetic is slowly increasing. Prices shown below are ceilings on typical grades of scrap:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.06½
Bufings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	—	@ 7.818
40x40	36 in.	6.15	lb.	—	@ 6.991
40x36	36 in.	6.50	lb.	—	@ 6.615
48x48	40 in.	2.50	lb.	—	@16.200
48x48	40 in.	2.85	lb.	—	@14.210
56x60	40 in.	3.60	lb.	—	@11.944
48x44	40 in.	3.75	lb.	—	@11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

The price of middling uplands on the Cotton Exchange has moved in a 67 point range since our last report, high for the period being 22.43 on July 17, the first day of the report, and low 21.76 on August 7. The average price for middling uplands for the month of July was 22.33 based on 25 trading days. Based on a nervous market, which was carefully watching the favorable war news, the price moved downward slowly during mid-July dropping below 22c for the first time since early June on July 21. A slight surge of trade buying brought it back over the 22c mark in the next few days, but hedge selling and liquidation dropped it below that figure again shortly thereafter. The price stayed below 22c for the first two weeks in August but in the past few days renewed trade buying has forced it slightly above that figure. On August 8 the Department of Agriculture forecast that this year's cotton crop will reach 11,022,000 equivalent 500-pound bales. The crop is growing on about 1,800,000 acres less than last year when production was 11,428,151 bales and on about 2,600,000 acres less than two years ago when the crop totalled 12,819,506 bales. Area for harvest this year was placed at 20,081,000 acres. Average production in the ten year period from 1933 to 1942 totalled 12,455,000 bales. Quotations for middling uplands on the Exchange follow:

	July 17	August 14		
	Close	High	Low	Close
October	21.64	21.39	21.16	21.24
December	21.47	21.19	20.98	21.06
March	21.34	21.00	20.76	20.84

Reclaimed Rubber

Demand for reclaimed rubber has increased somewhat in recent weeks and the lag experienced by the easing up of restrictions on the consumption of GR-S has practically disappeared. Although the demand seems to be general from all branches of the industry, it is reported that activity is prominent among manufacturers of battery boxes, sponge rubber, and footwear. The demand from producers of camelback, despite the growing availability of synthetic rubber for various grades, continues at a fair pace. Reclaim supplies continue at a fair level, although labor difficulties are still a major problem of the industry. A special advisory committee for the industry has been appointed by WPB.

Shoe				
Unwashed	lb.	.07	@	.07¼
Tube				
Black Tube	lb.	.11¼	@	.11½
Red Tube	lb.	.12	@	.12¼
Tires				
Black (acid process)	lb.	.07½	@	.07¾
Black, selected tires	lb.	.06½	@	.06¾
Truck, Heavy Gravity	lb.	.08½	@	.08¾
Miscellaneous				
Mechanical blends	lb.	.04½	@	.05½
White	lb.	.13	@	.13¼

Ducks

Enameling (single filling)	lb.	—	@	.44¼
Belting and Hose	lb.	—	@	.39
Single filling, A grade	lb.	—	@	.19¼
Double filling, A grade	lb.	—	@	.20¼

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Through three wars and each succeeding economic cycle, through every turbulent period in the history of reclaimed rubber—hundreds of manufacturers have relied on U. S. Rubber Reclaiming Company, Inc., for their widely diversified requirements.

Never has our dual policy of *independent operation* and *laboratory-controlled uniformity* been altered to meet a *transient* condition within the industry. Our complete production has *always* gone to our customers who depend upon the known quality of Black Diamond, Matchless, Tioga, Ivorylite, Buffalo Special and our other standardized brands for quality maintenance of their own products.

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CHEMICAL MARKETS

New York, Aug. 14, 1944
All Prices F.O.B. Works

ACCELERATORS

Organic

A-1 (Thiocarbanilid)	lb.	.28 @	.33
A-10	lb.	.36 @	.42
A-19	lb.	.52 @	.58
A-32	lb.	.60 @	.70
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.39 @	.41
Beutene	lb.	.59 @	.64
B-J-F	lb.	.34 @	.39
Butasan	lb.	— @	1.13
Butyl Zimate	lb.	— @	1.13
Captax	lb.	.34 @	.36
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.41
El-Sixty	lb.	.36 @	.43
Ethasan	lb.	— @	1.13
Ethyl Zimate	lb.	— @	1.13
Ethylidine aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.39 @	.48
Hepteen	lb.	.34 @	.39
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Ledate	lb.	— @	1.48
Methasan	lb.	— @	1.23
Methyl Tuads	lb.	— @	1.53
Methyl Zimate	lb.	— @	1.23
Monex	lb.	— @	1.25
Pentex	lb.	.74 @	.84
Phenex	lb.	.49 @	.54
Pip-Pip	lb.	— @	1.63
R & H 50-D	lb.	.42 @	.43
R-2 Crystals	lb.	— @	1.55
Rotax	lb.	.44 @	.46
Safex	lb.	1.15 @	1.42
Santocure	lb.	.60 @	.67
Selenac	lb.	— @	1.98
SPDX-G	lb.	.53 @	.58
Super-Sulfur No. 2	lb.	.13 @	.15
Thiocarbanilid, drums	lb.	.28 @	.33
Thiofide	lb.	.39 @	.46
Thiotax	lb.	.34 @	.41
Thiurad	lb.	— @	1.53
Trimene	lb.	.54 @	.64
base	lb.	1.03 @	1.18
Triphenylguanidine	lb.	.45 @	—
Ulto	lb.	.99 @	1.04
Ureka	lb.	.50 @	.57
Blend B	lb.	.50 @	.57
Blend C	lb.	.48 @	.55
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—

Inorganic

Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blues [b]			
Prussian	lb.	.36 @	—
Ultramarine	lb.	.17 @	.27
Browns [b]			
Mapico	lb.	.1135@	—
Umber, Turkey	lb.	.04¼@	—
Greens [b]			
Chrome	lb.	— @	.25
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¼@	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.096 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¼@	—
Whites [b]			
Cryptone No. 19	lb.	.0560@	.0585
Cryptone CB No. 21	lb.	.0560@	.0585
Cryptone ZS-800	lb.	.0825@	.0850
Lithopone:			
Albalith	lb.	.04¼@	.04½
Astrolith	lb.	.04¼@	.04½
Azolith	lb.	.04¼@	.04½
Ray-cal	lb.	.05½@	.05¾
Rayox	lb.	.14½@	.15¼
Titanox A	lb.	.14½@	.14¾
Titanox B	lb.	.05¾@	.06
Titanox C	lb.	.05½@	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼@	.07½
Anaconda, lead free	lb.	.07¼@	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼@	.07½
XX Red—4	lb.	.07¼@	.07½
XX Red—72	lb.	.07¼@	.07½
XX Red—103	lb.	.07¼@	.07½
Kadox, black label—15	lb.	.07¼@	.07½
Red label—17	lb.	.07¼@	.07½
St. Joe, black label	lb.	.07¼@	.07½
green label	lb.	.07¼@	.07½
red label	lb.	.07¼@	.07½
U. S. P.—7, bbls.	lb.	.10½@	.10¾
Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½@	.09¾
Green seal—8	lb.	.09 @	.09¼
Red seal—9	lb.	.08½@	.08¾
Yellows [b]			
Cadmolith	lb.	.55 @	.60
Chrome	lb.	— @	.50
Mapico	lb.	.071 @	—

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

BLACKS

(In bags, carload lots)

Arrow Compact		.0355@	—
Atlantic		.0355@	—
Certified		.0355@	—
Certified Spheron		.0355@	—
Channel "S"		.12 @	—
Continental		.0355@	—
Disperso		.0355@	—
Dixiedensed		.0355@	—
Dixiedensed 66		.0355@	—
Excello		.0355@	—
Furnex		.03½@	.06
Furnex Beads		.03½@	.06
Gastex		.03½@	.06
Kosmobile		.0355@	—
Kosmobile 66		.0355@	—
Kosmos-Dixie 20	lb.	.03½@	.06
Micronex (Amarillo)		.0355@	—
Micronex Beads (Amarillo)		.0355@	—
Pelletex		.03½@	.06
P-33		.04 @	—
Philblack A	lb.	.05 @	—
Shell Carbon (Del. Midwest)		.0240@	—
Sterling		.035 @	—
Supreme		.0355@	—
Thermax		.0225@	—
Thermax "S"		.0675@	—
Wyex		.0355@	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00	@24.50
99½%-300	ton	—	@16.50
86-90%-300	ton	—	@13.50
Asbestine	ton	16.50	@20.00
Atomite	ton	—	@27.50
Barium carbonate (98-100%)	ton	47.00	@49.00
Barytes	ton	25.35	@36.00
Bentonite	ton	11.00	@16.00
Blanc fixe, dry	ton	60.00	@67.50
Calcene	ton	37.50	@43.00
Catalpo (fact)	lb.	.02 @	—
Chalk, precipitated			
Suprex white	ton	32.50	@45.00
Clay, Aerfloted, Suprex	ton	11.00	@22.50
Aerfloted Paragon	ton	10.00	@22.50
Champion	ton	—	@11.00
Crown	ton	—	@11.00
Dixie	ton	—	@11.00
Kaolloid	ton	—	@ 9.00
Langford	ton	—	@ 8.50
Magnolia	ton	—	10.00
McNamee	ton	—	@10.00
Par	ton	—	@11.00
Witco	ton	10.00	@ —
Kalite No. 1	ton	—	@26.00
Kalite No. 3	ton	—	@36.00
Kalvan	ton	—	@100.00
Kalvan "G"	lb.	— @	.09½
Keystone white	ton	—	@14.00
Magnesium carbonate	lb.	.06¼@	—
Mineralite	ton	—	@30.00
Pyrax A	ton	—	@ 7.90
Rottenstone (powd. Dom.)	ton	25.50	@37.50
Rubberol	lb.	— @	.17½
Silene EF (calcium silicate)	lb.	.055 @	.06
Snowflake white	ton	—	@16.00
Talc, domestic	ton	17.00	@25.00
Whiting, commercial	ton	16.00	@26.00
Witco	ton	6.00	@ —
Witcal	ton	—	@100.00
Witcarb R-12	ton	—	@40.00
Wood Flour (100 mesh)	ton	30.00	@32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00 @	—
Black Diamond	ton	25.00 @	—
Hard Hydrocarbon	ton	25.00 @	27.00
MilliMar	lb.	— @	.05½

MISCELLANEOUS

Aromatics—Rodo #0	lb.	4.00 @	4.50
Rodo #10	lb.	5.00 @	5.50
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors	lb.	4.50 @	—
Aresklene No. 375	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.34
Santomerse S	lb.	.11 @	.25
Sponge Paste	lb.	— @	.18
Sunproof	lb.	.22¾@	.27¾
Tonox	lb.	.50 @	.59
Ty-Ply	gal.	6.75 @	8.00
Unicel (blowing agent)	lb.	.50 @	—

SOFTENERS

Acids			
Acetic, 28%, bbls. [a]	100 lb.	3.38 @	3.63
Nitric, 36 degrees	cwt.	5.00 @	—
Acids, Fatty			
Laurex	lb.	.14¼@	.15½
SL-20	lb.	.11 @	.13
Stearex Beads	lb.	.10 @	.11
Stearite	lb.	.10 @	—

Alkalies

Caustic Soda, 76%	cwt.	2.70 @	5.70
Soda Ash, 58%	cwt.	1.15 @	2.95

Oils

Degras, bbls.	lb.	.10 @	.12
Para-Flux	gal.	.17 @	.18
Para-Lube	lb.	.046 @	.048
Petrolatum, amber [b]	lb.	.03½@	—
Pigmentaroil, tank cars	gal.	.20½@	—
in drums	gal.	.26½@	.27½
Pine, tanks	gal.	.55 @	—
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol	lb.	.13½@	.14
Rubtack	lb.	.10 @	—
Seedine, c.l.	lb.	.07¼@	—
Witco Palm Oil	lb.	— @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—

Resins and Pitches

Pitch, Burgundy	lb.	.06 @	—
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	— @	4.50
Pigmentar, tank cars	gal.	.20½@	—
in drums	gal.	.26½@	.27½
Retort Pine Tar, drums	gal.	.26½@	.27½

Solvents

Acetone, pure [a]	lb.	.07 @	—
Benzene, 90%, tank car	gal.	.14 @	—
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.05
Carbon, bisulfide	lb.	05 @	.08½
Carbon tetrachloride	gal.	.83 @	1.27
Dichlorethylene	lb.	— @	—
Dipentene, cml., drums	gal.	.48 @	.50
Ethylene dichloride	lb.	.07½@	.08½
Plastogen	lb.	.07¾@	.08
Reogen (drums)	lb.	.11½@	.12
Rub-Sol	gal.	.09½@	—
Trichlorethylene	lb.	.08 @	.09½
Turpentine, spirits	lb.	.78½@	—
dest. dist., drums	gal.	.50 @	.55

Waxes

Beeswax, white [b]	lb.	.58 @	—
Carnauba, yellow [b]	lb.	.83¼@	—
Ceresin, white, dom.	lb.	.13½@	.15
Montan, crude	lb.	— @	—
Paraffin [a]			
Yellow crude scale, 124/126	lb.	.04¼@	—
Refined, 123/125	lb.	.05¼@	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.95 @	2.05
Gel	lb.	.52 @	.54
Hipar	lb.	.61 @	.63
Powder	lb.	.40 @	.42
Resin	lb.	.43 @	.45
Resin D	lb.	.43 @	.45
White	lb.	1.23 @	1.33
Albasan	lb.	.69 @	.74
Antox	lb.	.54 @	.56
B-L-E	lb.	.40 @	.49
Flectol H	lb.	.43 @	.50
Neozone A, B, C, D, E	lb.	.43 @	.63
Oxynone	lb.	.77 @	.90
Retardex	lb.	.44½@	.47½
Santoflex B	lb.	.43 @	.50
Santoflex BX	lb.	.54 @	.61
Santovar O	lb.	1.15 @	1.40
S.C.R.	lb.	.32 @	.34
Stabilite	lb.	.48 @	.50
Stabilite Alba	lb.	.69 @	.74
VGB	lb.	.43 @	.52

EXTENDERS

Naftolen R-100	lb.	.10 @	.12
Vanzak	gal.	.05 @	.06

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Colite	gal.	.90 @	1.15
Dipex	lb.	.06 @	.08
Glycerized Liquid Lubricant	gal.	— @	1.35
Lubrex	lb.	.25 @	.30
Mineralite	ton	— @	30.00
Sericite	ton	65.00 @	75.00
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25 @	—
Amberex Type B	lb.	.18¾@	—
Black	lb.	.08½@	.13
White	lb.	.09 @	.15
Brown	lb.	.10 @	.14
Neophax A	lb.	.16½@	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 3	lb.	.08 @	.12
Sulfur Chloride, yellow (drs.)	lb.	.03 @	.08
Sulfur, rubber makers			
Refined (bags)	cwt.	2.55 @	—
Commercial (bags)	cwt.	2.20 @	—
Tellov	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Industry.

The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H; Santoflex B, BX; Santovar O.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron 8, Ohio

CARBON BLACK
"Atlantic" Carbon Blacks meet the exacting standards of modern rubber production.
Chas. Eneu Johnson & Co., Mfrs.
Distributed by
C. P. HALL CO.
Akron — Boston — Los Angeles — Chicago

CHEMICALS
For Natural & Synthetic Rubber "PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.
Pennsylvania Industrial Chem. Corp.
Clairton Penna.

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York 20, N. Y.

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CHEMICALS
A complete line of plasticizers, resins, substitutes, fillers, etc., for Synthetic, Natural and Reclaimed Rubber.
STANDARD CHEMICAL COMPANY
Akron 8, Ohio

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 41 years.*
The Aluminum Flake Co.
Akron, Ohio

CARBON BLACK
CONTINEX SRF—A New Semi-Reinforcing Furnace Black. *Now in Full Scale Production.*
Continental Carbon Co., *Mnfr.*
Witco Chemical Co., *Distributor*
295 Madison Avenue
New York 17, N. Y.

CHEMICALS AND MINERAL
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York 13, N. Y.

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
33 Rector Street New York 6, N. Y.

CHEMICALS
PIGMENTS
ASPHALTUMS
Witco Chemical Company
295 Madison Avenue
New York 17, N. Y.

CALCENE—SILENE EF
Two exclusive Columbia pigments proving exceptionally valuable to Rubber Compounders. Send for free data sheets.
PITTSBURGH PLATE GLASS CO.
COLUMBIA CHEMICAL DIV.
Grant Bldg., Pittsburgh (19), Pa.

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

CLAY
*CHAMPION
*MAGNOLIA
National Kaolin Company
Distributed by
C. P. HALL CO.
Akron — Los Angeles — Chicago

CARBON BLACK-MICRONEX
The world's standard gas black; universally known as the "King of Rubber Pigments."
BINNEY & SMITH CO.
41 East 42nd St. New York 17, N.Y.

CHEMICALS
From Coal Tar Bases—For Use As Antiseptics, Plasticizers, Reclaiming Oils, Softeners, Solvents, Tacifiers.
Koppers Company
Tar and Chemical Div.
Koppers Bldg. Pittsburgh, Pa.

COAL TAR CHEMICALS
Coumarone Resins — Tack Producers
Resinous Oils — Dispersing Oils
Reclaiming Oils — Softeners
Solvents
The Neville Company
Neville Island, Pittsburgh, Penna.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
J. M. Huber, Inc.
460 West 34th St., New York 1, N. Y.

CHEMICALS
For Rubber — For Industry Generally
Accelerators — *Acids* — *Latex*
Antioxidants — *Oil of Myrbane* — *Lotol*
Specialties — *Aniline Oil* — *Dispersions*
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK 20, N. Y.

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

The Market Place

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Rubber Industry. If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials (continued)

COLORS
BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

COMPOUNDING Materials
Vulcanizing Agents
Accelerators
Antioxidants
Plasticizers
Dispersions
Pigments
Clays
Mineral Rubber
Aromatics
Blacks
R. T. VANDERBILT CO.
230 Park Ave. New York 17, N. Y.

CUMAR —Paracoumarone Resin.
A neutral gum for synthetic rubber compounding. *Laboratory test data, samples and prices on request.*
THE BARRETT DIVISION
Allied Chemical & Dye Corp.
40 Rector St., New York 6, N. Y.

DU PONT Rubber Chemicals
DU PONT RUBBER COLORS
DU PONT ACCELERATORS
DU PONT ANTI-OXIDANTS
E. I. du Pont de Nemours & Co., Inc.
RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

EXTENDER
NAFTOLEN R 100 — Extender for Crude Rubber, Reclaim, Synthetics.
Wilmington Chemical Corporation
10 E. 40th St., New York 16, N. Y.

"FACTICE"—Prevents blooming, makes colors fast and a smoother batch.
(Reg. U. S. Pat. Off.)
Stamford Rubber Supply Co.
Stamford, Conn.

FURNEX—FURNEX BEADS
The High Resilience Semi-Reinforcing Black
BINNEY & SMITH CO.
41 East 42nd St. New York 17, N. Y.

GASTEX
Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.
Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon
Pampa, Texas

IRON OXIDES
Asbestine—Barytes—Talc—Soapstone
C. K. Williams & Co.
EASTON, PA.

MAGNESIA
Calcined Magnesia—for neoprene
Carbonate of Magnesia—precipitated
The Philip Carey Mfg. Co.
Cincinnati Ohio

MAGNESIUM OXIDE
Calcined Magnesium Oxide prepared for use in the compounding of neoprene. Full details on request.
J. T. Baker Chemical Co.
Phillipsburg New Jersey

MAGNESIUM OXIDE
Extra Light—Original neoprene type
Also Light, Medium and Heavy types
General Magnesite & Magnesia Co.,
2960 East Venango St., Phila. 34, Pa.

MICA
"CONCORD" Wet Ground Mica
Its *White, Pure* and *Uniform*
Send for Samples and Prices
CONCORD MICA CORP.
Penacook Station Concord, N. H.

MOLD LUBRICANT
"Orvus" enables articles to leave molds readily; molds clean easily. Effective in hardest water. Also acts as thorough cleanser for molded and extruded rubber goods.
PROCTER & GAMBLE
Cincinnati Ohio

OROPLAST
Plasticizer—Sulphur Reactive
High Loading Tolerated
Great Elongation Produced
Cool Processing Stocks
Advance Solvents & Chem. Corp.
245 Fifth Ave., New York 16, N. Y.

PARA-FLUX
The Universal Softener—Adaptable, Uniform. Improves Quality—Economical.
The C. P. Hall Co.
2510 First Central Tower
Akron Ohio

PELLETEX (The pellet *Gastex*)
The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.
Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
GENERAL ATLAS CARBON
Pampa, Texas

PLASTICIZERS and SOFTENERS
For Synthetic Rubber, Polyvinyl Butyral, etc.
Glyco Products Co., Inc.
26 Court St., Brooklyn 2, N. Y.

RUBBER PROCESSING OILS
For outstanding compatibility in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
Philadelphia Pennsylvania

RUBBER SUBSTITUTES
White, brown and black.
The Carter Bell Mfg. Co.
Springfield, New Jersey

SOFTENERS
Rosin Oil — Pine Tar
Burgundy Pitch
"Galex" — a non-oxidizing Resin
National Rosin Oil & Size Co.
RKO Bldg., New York 20, N. Y.

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Chemicals and Compounding Materials {continued}

SOLVENTS

"Skellysolve"—A superior solvent in six different types for various uses—for making rubber cements—for many different rubber fabricating operations.

SKELLY OIL CO., SOLVENTS DIV.
Skelly Bldg., Kansas City, Mo.

TITANIUM PIGMENTS
TITANOX

Unsurpassed in
OPACITY, WHITENESS, BRIGHTNESS
Titanium Pigment Corp., Sole Sales Agent, 111 Broadway, New York, N. Y.
104 South Michigan Ave., Chicago
350 Townsend Street, San Francisco
2472 Enterprise Street, Los Angeles

ZINC OXIDE PIGMENTS

The XX Reds Kadox

ZINC SULPHIDE PIGMENTS

The Cryptones The Albaliths (Lithopones)

The New Jersey Zinc Sales Co.
New York *Chicago*
Cleveland, Boston, San Francisco

STEARIC ACID

STEAREX . . . CAKE or POWDER
STEAREX BEADS
Standardized Products for Rubber Compounding
MINERAL RUBBER (Parmr), TALC
SOAPSTONE

BINNEY & SMITH CO.
41 East 42nd St. New York 17, N. Y.

ZINC OXIDES

AZO ZZZ Zinc Oxides
lead free—pure—uniform—dependable
AZO ZZZ-11 AZO ZZZ-55
AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66

American Zinc Sales Company
Columbus, Ohio *New York*
Chicago *St. Louis*

ZINC OXIDES

Black Label Red Label Green Label
Manufactured by Our New Electrothermic Process

St. Joseph Lead Co.
250 Park Ave. New York 17, N. Y.
Plant and Laboratory: Monaca (Josephtown), Pa.

SULPHURS

Rubbermakers' TIRE BRAND and TUBE BRAND. Also CRYSTEX Insoluble Sulphur, Sulphur Chloride, Caustic Soda, Carbon Bi-Sulphide, Carbon Tetra-Chloride.

Stauffer Chemical Company
2710 Graybar Bldg., New York 17, N. Y.

The Progressive Concern Selling to Rubber Manufacturers Uses THE MARKET PLACE for Results

ZINC STEARATE
ZINC LAURATE

Colite Mold Lubricant for Extra High Gloss

THE BEACON COMPANY
87 Bickford St., Boston, Mass.

Machinery and Equipment

BANBURYS REPAIRED

Re-building and re-surfacing rotors and mixing chambers has been our specialty for years.

INTERSTATE WELDING SERVICE
914 Miami St. Akron, Ohio

CUTTING MACHINERY

Specialists in Rubber Cutting Equipment for Bands, Crude Stock, Jar Rings, Tubes, Rollers, Washers, Treads, Cement Stock, etc.
See Black Rock for All Cutting Problems

Black Rock Manufacturing Co.
179 Osborne St. Bridgeport, Conn.

FORMS - PORCELAIN

Exclusive Manufacturers of Vitreous Porcelain Closed End Forms
No matter what shape or design—we can make it. Send blue print or sketch for our prices.

The Colonial Insulator Co.
936 Grant St. Akron, Ohio

CALENDER SHELLS

Gammeter's
ALL STEEL Calender Shells.
All welded. Any size.
New and better.

The W. F. GAMMETER CO.
Cadiz Ohio

DIAL GAUGES—Thickness

For measuring the thickness of rubber and similar materials. Many models.

Frank E. Randall
248 Ash St.,
Waltham Mass.

GRINDING MILLS

SPAN grinding mill reduces soft and hard rubber to fine powder.
Made in U. S. A.

M. Pancorbo
155 John St. New York 7, N. Y.

CUTTING DIES

Cutting and perforating dies of all types for rubber manufacturers.
Send for our quotations

Brockton Cutting Die & Machine Co.
Avon, Mass.

DRYING MACHINERY

For Synthetic Rubber, Reclaimed Rubber, Latex Processed Materials, etc.

PROCTOR & SCHWARTZ, INC.
Seventh St. & Tabor Rd. Philadelphia, Pa.

MACHINERY—RUBBER

"Master" Tube Molds, Tire Vulcanizers, Molds and Cores, Tire Drums, Tubers, etc.
Special Machinery Built to Order

Akron Standard Mold Co.
Akron, Ohio

CUTTING DIES

Also Tools, Dies, Jigs, Fixtures, Machine Parts and Special Machinery. Now engaged in Prime and Subcontract Work, Defense and Civilian.

Independent Die & Supply Co.,
LaSalle & Ohio Sts. St. Louis 4, Mo.

EXTRUDERS

The pioneer line of tubers, strainers and wire insulating machines. For latest developments inquire of

JOHN ROYLE & SONS
Paterson 3 New Jersey

MACHINERY

L. ALBERT & SON

Trenton, N. J. Stoughton, Mass.

Los Angeles, Calif. Akron, O.

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MACHINERY
A complete service from the design of machinery to finished products of all kinds. Equipment for Plantations — also Reclaim, Latex and Rubber Plants.
Layouts — Formulas — Processes
Continental Machinery Company
305 BROADWAY, NEW YORK 7, N. Y.

MANDRELS—All Types
Circular and Straight—Aluminum and Steel
Licensed Under Clyde E. Lowe Co. Patents
Sherardizing and Chrome Plating
Machinery—Air Bag & Mandrel Polishing
National Sherardizing & Machine Co.
Hartford, Conn. Akron, Ohio

SPECIAL MACHINERY
For Quality and Efficiency in Working Rubber. Consult us about your problems.
Utility Manufacturing Co.
Cudahy, Wisconsin

MACHINERY
A Comprehensive Line of Rubber and Plastic Equipment Including Tubers and Extruders, Tire Builders and Vulcanizers, Spreaders, Mixers, etc.
National Rubber Machinery Co.
Akron, Ohio

MOLDS
For tires, rubber specialties and mechanical goods; general machine work.
The Akron Equipment Co.
Akron, Ohio

STOCK SHELLS
A Type for Every Need—Large Diameter—Light Weight — Extra Strong — Seamless.
National Sherardizing & Machine Co.
Hartford, Conn. Akron, Ohio

MACHINERY
Cutting, Trimming, Skiving, Cementing, Eyeletting, Cutting Dies—Eyelets.
United Shoe Machinery Corp.
140 Federal St., Boston, Mass.

Processing Equipment
For Reclaiming Rubber
Attrition Mills; Conveyors; Crushers; Cutters; Elevators; "Frigidisc" Grinders; Hammer Mills; Mixers, Sifters, etc.
MERCER-ROBINSON CO., INC.
30 Church St., New York 7, N. Y.

TESTING MACHINES
RUBBER TENSILE TEST MACHINES
TEXTILE TESTING MACHINES
Write for Descriptive Literature
Henry L. Scott Co.
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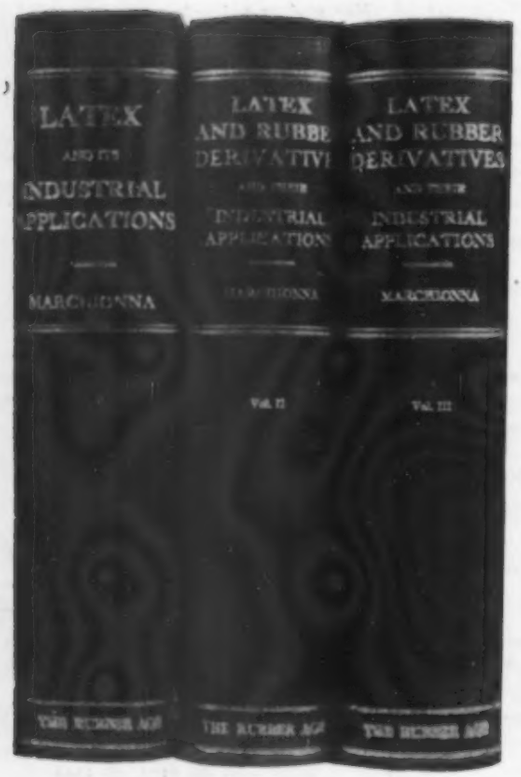

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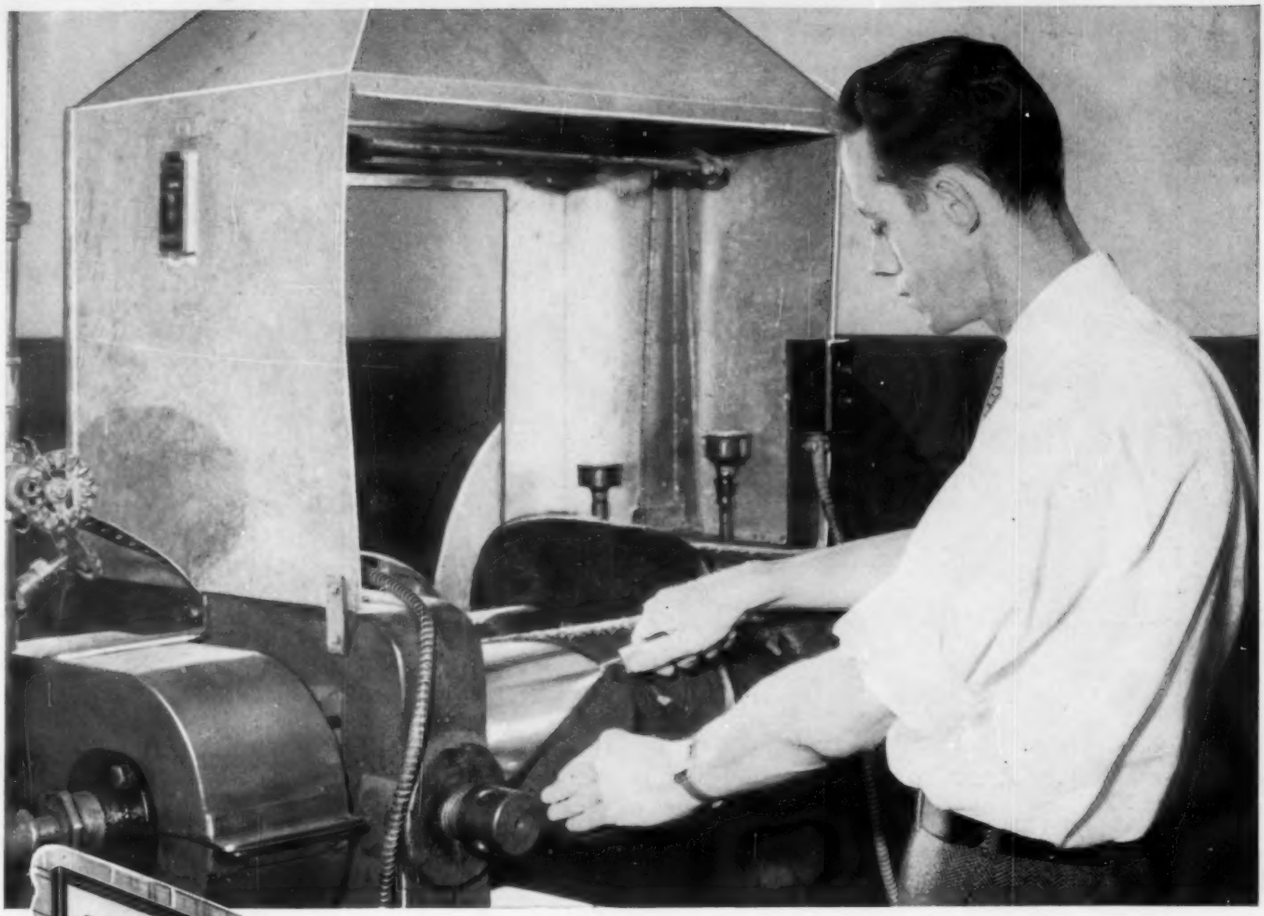

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